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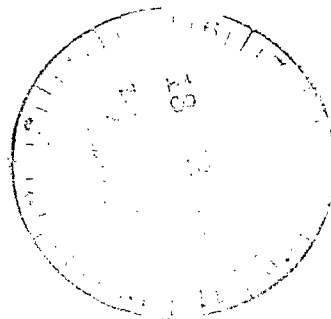
TACT1, A Computer Program for
the Transient Thermal Analysis
of a Cooled Turbine Blade or Vane
Equipped With a Coolant Insert
II - Programmers Manual



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JANUARY 1979

NASA





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**TACT1, A Computer Program for
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Equipped With a Coolant Insert
II - Programmers Manual**

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**Scientific and Technical
Information Office**

1979

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SUMMARY

A FORTRAN IV computer program to calculate transient and steady-state temperatures, pressures, and flows in a cooled turbine blade or vane with an impingement insert has been developed and is described in this report. Coolant-side heat-transfer coefficients are calculated internally in the program, with the user specifying one of three modes of heat transfer at each station: (1) impingement, including the effect of crossflow; (2) forced-convection channel flow; or (3) forced convection over pin fins. Additionally, a limited capability to handle film cooling is available in the program. It is assumed that spent impingement air flows in a chordwise direction and is discharged through a split or drilled trailing edge and through film-cooling holes. The program does not allow for radial flow of the spent impingement air. The use of film cooling is restricted by a numerical model requirement for a continuous coolant-channel flow.

Input to the program includes a description of the blade geometry, coolant-supply conditions, outside thermal boundary conditions, and wheel speed. The user can divide the blade by chordwise cuts into as many as 15 slices and can divide each slice into as many as 79 stations around the blade. Each station in turn consists of four calculational nodes through the wall and one in the coolant channel. The blade wall can be two layers of different materials, such as a ceramic thermal-barrier coating over a metallic substrate. Program output includes the temperature at each node, the coolant pressures and flow rates, and the coolant-side heat-transfer coefficients.

INTRODUCTION

As core turbine-engine operating conditions become more severe, it becomes more difficult to effectively cool blades and vanes. Advanced transient thermal calculational techniques are needed to design reliable turbine blades. However, there appears to be no computer program generally available that uses these advanced techniques in combining the required heat-transfer and coolant-flow-distribution calculations. Thus, it was decided to create a computer program that would perform both transient and steady-state heat-transfer and coolant-flow analyses for a cooled blade, given the outside hot-gas boundary conditions, the coolant inlet pressure or flow rate, the geometry of the blade shell, and the cooling configuration.

The resulting program, TACT1, can handle a turbine blade or vane that is equipped with a central coolant-plenum insert from which coolant air flows through holes to impinge on the inner surface of the blade shell or directly into the trailing-edge region. It

is assumed that the spent impingement air then flows chordwise and is dumped through a split or drilled trailing edge and through film-cooling holes. The blade is modeled by dividing it by chordwise planes into as many as 15 slices, with each slice having as many as 79 calculational stations around the blade. Temperatures at each station are calculated for four points through the wall and one in the coolant channel. Included in this model is the capability to analyze a blade with a ceramic thermal-barrier coating. The ability of the program to model film cooling is limited by the numerical flow analysis requirement for a continuous coolant-channel flow.

The TACT1 program is used at the NASA Lewis Research Center on an IBM TSS/360-67 computer. The source program consists of approximately 6000 lines of code and the program requires about 60 000 words of storage. Typical running times for the program are 1.4 seconds of central processor unit (CPU) time per calculational station for a steady-state run and 0.4 second of CPU time per station per time step for a transient run.

The TACT1 program is reported in two parts. This report, part II, is a programmers manual and includes a complete program listing and a detailed description of the procedure. Part I (ref. 1) is a users manual and contains all the information necessary to run the program: a detailed description of the input, the method of solution, and the output as well as a sample problem.

OVERVIEW

Method of Analysis

The details of the analytical method are presented in part I (ref. 1). The blade model used in the analysis is described briefly in this section.

Blade geometric model. - The key to creating a usable computer program is to have as simple a geometric model as possible for the system being analyzed. In this program, the emphasis is on a blade or vane with a central coolant plenum and chordwise flow of the coolant after impingement. Therefore, it was decided that the primary calculational direction would also be chordwise. The blade is divided into layers that are bounded by chordwise cuts through the blade, as shown in figure 1. Each slice is treated separately in the program, with radial heat conduction in the wall the only communication between layers.

Figure 2 gives the details of the geometric model for a single blade slice and shows the breakdown of the blade or vane into calculational stations and nodes. Each calculational station consists of five nodes: one at the wall outer surface, one at the interface between the coating and blade metal, one at a point midway through the wall metal, one at the wall inner surface, and one in the middle of the coolant channel.

For input to the program, the following basic elements of the geometry are needed for each station: (1) the thicknesses of the wall coating and wall metal and the coolant-channel width, (2) the distance of each node from the adjacent lower-numbered node, and (3) the radial span for this slice. In addition, depending on the mode of heat transfer specified, the user must supply impingement-hole diameter and spacing or pin-fin diameter and spacing. Thermal properties of the blade materials must also be specified. The input is described in detail in reference 1.

Numerical model. - The numerical solution for the temperatures throughout the blade involves writing a transient energy-balance equation for each node and forming a set of equations to be solved for the temperature distribution. Similarly, the coolant pressure distribution is determined by writing the transient momentum equation for flow between adjacent fluid nodes and solving the resulting set of equations for static pressures.

The nodal energy balances are linearized, one-dimensional heat-conduction equations at the wall outer-surface node, at the coating-metal interface, and at the wall inner-surface node. At the midmetal node, a linearized, three-dimensional, heat-conduction equation is used. In the coolant channel, energy and momentum equations for one-dimensional compressible flow including friction and heat transfer are written for the elemental channel length between two coolant nodes. The equations used are presented in reference 1.

General Program Description

The TACT1 program is capable of performing a transient analysis as well as a steady-state analysis. In the case of a transient, the program first performs steady-state calculations to determine the initial conditions for the transient.

Figure 3 shows a schematic of the TACT1 calculational scheme. There are three basic, nested calculational loops that must converge for a steady-state solution to be reached. These loops are labeled A, B, and C in figure 3. The program begins a steady-state analysis with the coolant-supply pressure and total coolant flow fixed. The impingement flow is initially assumed to split uniformly at the leading-edge stagnation station, station 1. All coolant flows for the slice under consideration are calculated first, based on the current pressure distribution. The temperatures at each node are then calculated by solving simultaneously the energy equations presented in reference 1. The pressures at each coolant node are calculated by solving simultaneously the momentum equations presented in reference 1. This cycle, loop A in figure 3, is repeated until the pressure distribution no longer changes. The flow split between suction- and pressure-side coolant channels is then checked by comparing the pressures at the ends of the two channels. If they do not match, the impingement flow split at the leading edge

is adjusted and the inner loop calculations are repeated. This adjustment comprises loop B in figure 3. Once the proper flow split is achieved, the program moves up the blade to the next slice and repeats this sequence. After all N slices have converged, the total coolant mass flow used is compared with the inlet coolant mass flow. If there is an imbalance, either the inlet flow or the supply pressure is adjusted, depending on which was specified in the input; and the calculations start over. This is loop C in figure 3. Once the overall coolant mass flow balance is satisfied, the steady-state solution is complete and the transient calculations begin. During a transient calculation, loop B is bypassed because the coolant flow-split is primarily a function of blade geometry. Loop C is also bypassed because the inlet coolant mass flow rate at a given time is estimated based on the coolant mass flow used at the previous time step and the change in supply pressure.

The TACT1 subprograms and the calling relations are shown in figure 4. Block data subprogram NGASDAT contains air properties, for use in TACT1, tabulated as functions of temperature at a pressure of 20 atmospheres from reference 2. This subprogram must be loaded before execution of the program. The main program, NTTACT, calls other subroutines in their proper order.

The first call from NTTACT is to GETIN, a subroutine that controls the reading, storing, and printing of input data. Subroutine GETIN calls INPUT to print the input data if the user specifies INEDIT > 0. Subroutine INPRT has a call to PREP to put the input data in its proper form for use. All data are input by using a NAMELIST format.

After the input data have been read, the number of time steps, NTYM, to be used in the transient is determined in NTTACT. If only a steady-state solution is to be calculated, NTYM = 1. Time-dependent boundary conditions are then evaluated, with the initial entries assumed to be steady-state values. Then NTTACT loops through the blade, calling on subroutines PLNUM, PREP, and TCOEF for each slice. The first time through is a steady-state calculation.

Subroutine PLNUM calculates the pressure distribution in the impingement plenum for the current slice, given the inlet pressure and coolant flow-rate. PLNUM calls GASTBL for gas properties.

Subroutine PREP extracts the input data for the current slice from the input arrays.

Subroutine TCOEF controls loop A in figure 3, the iterative calculations of temperature and pressure for the nodes of the current slice. Each iteration in TCOEF requires calls to subroutines FLOWS, HCOOL, THRCON, TARRAY, PARRAY, and GAUSS.

Subroutine FLOWS computes the impingement jet flow rates, coolant-channel mass flow rates, and channel Mach numbers for each station around the blade, given the plenum pressure and temperature and the current pressure distribution in the coolant channel. FLOWS calls GASTBL for gas properties.

Subroutine HCOOL is called to calculate coolant heat-transfer coefficients for all the stations of this slice, based on the latest values of mass flow rate. HCOOL calls function HCFRCD to calculate forced-convection heat-transfer coefficients and GASTBL for gas properties.

Subroutine THRCON determines the wall thermal conductivity from the input table of conductivity as a function of temperature.

Subroutine TARRAY sets up the array of coefficients for the conduction and convection equations for each node. Calls are made to HCPINS for pin-fin heat-transfer coefficients, to HCFRCD for forced-convection heat-transfer coefficients, and to GASTBL for gas properties. TCOEF calls subroutine GAUSS to solve the set of equations for the temperature at each node.

Subroutine PARRAY sets up the array of coefficients for the momentum equations in the coolant channels and TCOEF calls subroutine GAUSS to solve the set of equations for the pressure at each coolant node.

After a new set of temperatures and pressures has been determined, convergence is checked by using the coolant-channel pressure at the blade leading edge. If this pressure stays within a tolerance band for four successive iterations, convergence is accepted. Once convergence is achieved, TCOEF calls subroutine FLSPLT to check the coolant flow-split between the pressure and suction sides. This is loop B in figure 3. Initially, the impingement jet flow at the forward stagnation station is assumed to split evenly between the suction- and pressure-side channels. If the coolant-channel pressures at the end of the impingement insert do not match, the flow split at the forward stagnation station is adjusted to increase the flow to the channel with the higher pressure at the end of the insert, and iteration loop A is repeated. Once a satisfactory flow split has been achieved, TCOEF calls subroutine WROUT to print the output for this slice and calls subroutine PLOTMF if there is to be graphical output. After NTTACT has calculated all blade slices, the total coolant mass flow is compared with the impingement-plenum inlet mass flow rate used to start the calculations. If the two flow rates are not close enough, the inlet mass flow or supply pressure is adjusted and the calculations are repeated. This is loop C in figure 3.

When the initial steady-state solution has been completed, the transient calculations are started. The transient is continued until the time reaches the specified maximum.

Subroutine PLOTMF makes use of a TSS/360 graphics package at the NASA Lewis Research Center to plot temperature and pressure distributions for the blade.

DETAILED PROGRAM PROCEDURE

Table I lists the names of each of the subprograms in TACT1, the corresponding

TSS/360 source module names, the COMMON blocks used in each, the names of the subroutines called by each, and the names of subroutines calling each. Table II is a cross-reference listing of named COMMON blocks and the subprograms using them. This section gives a detailed description of each subprogram used in TACT1. All variable names used are defined in the section DICTIONARY. The BLOCK DATA subprogram and the MAIN PROGRAM are discussed first and then each subprogram is described, in alphabetical order.

Block Data NGASDAT

A BLOCK DATA subprogram, NGASDAT, is used to provide a table of gas properties to the program. The properties are put in the array GS through a DATA statement with $5 \times NG$ entries, where NG is the number of table entries for each property. The first NG values are temperatures, the second are thermal conductivities, the third are specific heats, the fourth are Prandtl numbers, and the final NG values are viscosities. The property values included are taken from reference 2 at a pressure of 20 atmospheres.

Main Program NTTACT

The MAIN PROGRAM for TACT1, NTTACT, has overall control of the program. Figure 5 is a flow chart for NTTACT. During initialization, a call is made to a system subroutine, TIME, to get a unique label to be used to identify the plotted output for a given run. After the call to GETIN, where all the input data are read, NTTACT initiates the solution procedure by searching the transient boundary condition tables and using linear interpolation to extract the values for the current time. The next step is to begin the loop, labeled C in figure 3. The solution progresses from hub to tip. For each slice, NTTACT calls PLNUM to calculate coolant-supply conditions; PREP to extract the input data from the input tables; and TCOEF to calculate flows, temperatures, and pressures. After the return from TCOEF, NTTACT updates the total amount of coolant used, WUSED, by adding the amount used in the current slice, WIM. The amount of coolant-plenum flow available for the remaining slices, WPLEN, is updated by subtracting WIM. After all slices have been done, the overall amount of coolant used is printed and then checked against the assumed coolant flow-rate. If the absolute value of the difference, EXCESW, is more than 1 percent of the assumed flow, the assumed flow or the supply pressure is adjusted and the calculations are repeated. For transient runs, after the initial steady-state coolant-flow balance, there are no more iterations on coolant flow. Instead the flow for a given time step is based on the actual flow used in

the preceding time step and on the ratio of supply pressure for the two steps. Finally, once all loops have been completed, NTTACT calls PLOTMF to get a final summary plot of blade temperatures.

Subroutine FLOWS

Subroutine FLOWS is a routine to calculate the flow rates through all impingement and film-cooling holes, the friction factor in the coolant channels, and film-cooling effectiveness. FLOWS makes use of the current impingement-plenum mean pressure and temperature and coolant-channel pressure and temperature distributions. The impingement jet flow-rate, WJ, is calculated for each station in the forward region and checked against the choked flow-rate, WCR. If WJ is greater than WCR, then WJ is set equal to WCR. If there is any film cooling on the blade, the film-cooling flow rates in the forward region, WFC, are also calculated. Then, the coolant-channel flow rates, WCROS, are computed by considering a mass balance between stations, as illustrated in figure 6. Once the forward-region coolant flows have been determined, the Reynolds numbers - RE for the coolant channel, and REFC for the film-cooling flow - and the square of the coolant Mach number, AM2, are computed for each forward station.

The next step is to calculate the amount of coolant, WDUMP, dumped directly into the trailing-edge region from the coolant plenum. Then the total amount of coolant used for this slice, WIM, is determined by summing the impingement jet flows and WDUMP. Following this, the flows in the trailing-edge region are computed, with the coolant flow being reduced by the amount of any film-cooling flow. Then, trailing-edge-region values of RE, REFC, and AM2 are calculated.


After all the coolant flow-rates are determined, the friction factor, FF, is calculated at each station. Finally, if there is any film cooling used, the film effectiveness is calculated by using the method of reference 3.

Subroutine FLSPLT

Subroutine FLSPLT is used to determine the location of the stagnation impingement jet, station JS, and the fraction of that jet's flow that splits to each side of the blade, DELTAN. Figure 7 is a detailed flow chart for subroutine FLSPLT. The primary variable carried into FLSPLT is the pressure-match parameter, EPSN, which is defined as

$$EPSN = \frac{(P(2, ISLICE, NFWD-1) - P(2, ISLICE, NFWD))}{P(2, ISLICE, NFWD-1)} \quad (1)$$

where the pressures are as illustrated in figure 8.



The magnitude and sign of EPSN are used to determine the adjustment of the stagnation impingement-jet row location and the fraction of that jet that splits to the suction-side channel. Initially, the stagnation jet row is located at station 1 and the split is $\text{DELTAN} = 0.50$. If EPSN is positive, DELTAN is set to 0.75 to increase the flow down the suction-side channel; if EPSN is negative, DELTAN is set to 0.25 to increase the flow down the pressure-side channel. For subsequent entries into FLSPLT, the value of DELTAN is adjusted by passing a straight line through the last two points on a plot of EPSN versus DELTAN and picking the value of DELTAN where this line crosses the axis at $\text{EPSN} = 0$. If this intercept falls outside the DELTAN range of 0 to 1, the stagnation station, JS, must be moved to an adjacent station and DELTAN set to 0.50. Once a sign change is observed in EPSN, a fine-tuning process is triggered in FLSPLT. In this case, the values of DELTAN and EPSN for the iteration preceding the sign change are saved and used as one of the points of the straight-line interpolation scheme for all subsequent iterations.

Subroutine GASTBL

Subroutine GASTBL is used to interpolate in the array GS for gas properties, given the absolute temperature. Linear interpolation is used.

Subroutine GAUSS

Subroutine GAUSS is a routine that uses Gaussian elimination to solve a set of simultaneous equations. The array of coefficients, TCOF, is in the form of a compressed, augmented band matrix. That is, only the matrix elements within the band and the constants from the right side are stored in TCOF. The matrix band width, K, is determined by the node-numbering system used. In TACT1, the temperature calculations require a band width of 23 elements, and the pressure calculations require 19.

Subroutine GETIN

Subroutine GETIN is a routine used to initialize input-data default values and to read and store input data. Input is in NAMELIST form as described in reference 1. The entire data set is read, and the input variables for each slice are stored in two arrays: INDCHN for integer data, and CHANL for real-number data. If the input is provided in SI units, subroutine GETIN converts it to U.S. customary units for internal use. If the user specifies $\text{INEDIT} > 0$, GETIN calls subroutine INPRT to print out the input data.

Function HCFRCD

Function subprogram HCFRCD is a routine to calculate a turbulent, forced-convection heat-transfer coefficient for channel flow as described in reference 1.

Subroutine HCOOL

Subroutine HCOOL is a routine containing the correlations for impingement heat transfer. The first part of HCOOL deals with leading-edge-region impingement cooling. In this part, the inner surface length from the stagnation impingement jet to the end of the leading-edge impingement region is determined and then used in a correlation to compute the average heat-transfer coefficient in this region. Beyond this region, for stations starting at ICOR, calculations are done by using an impingement-with-crossflow correlation.

Subroutine HCPINS

Subroutine HCPINS is a routine to calculate coolant-side heat-transfer coefficients in regions of the blade equipped with pin fins. In addition, the effective heat-transfer area, which accounts for the pin surface area and the pin-fin effectiveness, is calculated.

Subroutine INPRT

Subroutine INPRT is a routine to print a listing of the input data. Also, INPRT sets up the initial temperature distribution in the blade. Subroutine PREP is called for each slice to extract input data from the arrays INDCHN and CHANL.

Subroutine PARRAY

Subroutine PARRAY is a routine to set up the matrix to be solved for coolant-channel pressure distribution. The equations used are detailed in reference 1.

The array of coefficients generated in PARRAY, TCOF, is in the form of a compressed, augmented band matrix. Coefficients that would be on the main diagonal of the full matrix are stored in column 10 of the TCOF array. The terms from the right side of the equations are stored in column 20 of TCOF.

Subroutine PLNUM

Subroutine PLNUM is a routine to calculate the pressure and temperature distributions in the central coolant plenum. The mean plenum static pressure and temperature for each slice are used as the supply conditions for the impingement jets. The total temperature and pressure at the outlet of one plenum slice are used as input for the next slice.

There are five arguments used in the call statement for PLNUM: WXX is the mass flow rate into this plenum slice; PXX and TXX are the calculated, average static pressure and temperature; and PTEXT and TTEXT are total temperature and pressure, respectively. Going into the subroutine, PTEXT and TTEXT are the values at the entrance to this slice. On return, they are the values at the exit of this slice.

Subroutine PLOTMF

Subroutine PLOTMF is a routine that plots TACT1 output. PLOTMF makes use of a TSS/360 graphics package at the NASA Lewis Research Center. For an installation without this specific package, this subroutine would have to be revised or bypassed.

PLOTMF plots temperature and pressure versus surface distance from station 1 for each slice of the blade for a steady-state case. For transients, a set of two summary plots is made for each time step: the plots contain temperatures for all slices on one graph.

Subroutine PREP

Subroutine PREP is a routine to extract input data from storage and put it in the form used in the calculations. In PREP, the hot-gas-side boundary condition tables are searched and linear interpolation is done to extract the boundary condition values at each calculation station at the given time.

Subroutine TARRAY

Subroutine TARRAY is a routine to set up the matrix to be solved for the temperatures in each slice. The equations used are detailed in reference 1.

The array of coefficients generated in TARRAY, TCOF, is in the form of a compressed, augmented band matrix. The 12th column of TCOF contains the elements that would be on the main diagonal of a full matrix. The terms from the right side of the equations are stored in column 24.

Subroutine TCOEF

Subroutine TCOEF is a routine that controls the calculations for flow rates, temperatures, and pressures. The first time TCOEF is entered for each slice an initial estimate of the coolant-channel pressure distribution is set up. TCOEF controls the iterations in loops A and B in figure 3. Loop A consists of calls to subroutines FLOWS, TARRAY, and PARRAY. The variable IVERGE is used to count the number of iterations in loop A. Convergence is checked by comparing the four most-recent values of coolant-channel pressure at the flow-split point. When the ratio of the maximum difference among these four to the difference between coolant-supply pressure and trailing-edge exit pressure is less than PCNVRG, loop A is complete. Then the flow split at the stagnation impingement jet, JS, is checked by subroutine FLSPLT and adjusted if necessary. Loop B involves repeating loop A for a new flow split. The variable IDELT is used to count the number of flow-split iterations in loop B. Once flow-split convergence is achieved, WROUT is called to print the output for the current slice.

Subroutine THRCON

Subroutine THRCON is a routine that takes the wall temperatures and searches for the thermal conductivity values in the input tables.

Subroutine WROUT

Subroutine WROUT is a routine to control the printing of the output from TACT1. Output units are the same as the input data units.

DICTIONARY

All the important variable names used in the TACT1 code are defined in this section. The only names not defined are locally used indices. All dimensioned variables include the dimensions. The dictionary also indicates the COMMON block or subroutine in which each variable is used.

Variable	Common	Subroutine	Definition
A(400)	TCO		cross-sectional area normal to chord-wise direction, in ² , accessed by node number
AA		GETIN	outer-surface length between stations, in., used for calculating interpolated values of TDLX(2), TDLX(3), and TDLX(5)
AA		PLNUM	coolant-plenum cross-sectional area, in ² , used in plenum pressure-drop calculations
AB		PLNUM	maximum Mach number in coolant plenum
AC(5)		GASTBL	array of interpolated values of gas properties
ACH		PLNUM	coolant-plenum choked-flow indicator
ADUMP	TCO		area of slot or jets dumping coolant directly into trailing-edge region, in ²
ADUMPC		INPRT	same as ADUMP, but converted to cm ² for input listing when input is in SI units
AHG		PREP	intermediate value of hot-gas-side heat-transfer coefficient, Btu/hr · ft ² · °F, used for interpolating in input table during a transient
AHTRN1		TARRAY	inner-surface area for heat-transfer purposes, in ²
AHTTR		HCPINS	total surface area in pin-fin channel, in ²
AINTRV		PLOTMF	floating-point form of number of temperature intervals in summary plots
AJ		PLNUM	floating-point form of indicator J - 1
AJET(80)	TCO		total area of impingement jets at each station, in ²

Variable	Common	Subroutine	Definition
AJET(80)		FLSPLT	total area of impingement jets at each station, in ² , carried into subroutine as argument
AKC(15, 80)	TCO		wall outer-coating thermal conductivity, Btu/hr · ft · °F
AKCTBL(20)	BOUND		input table of wall outer-coating thermal conductivity, Btu/hr · ft · °F, versus temperature, °F
AKW(15, 80)	TCO		wall metal thermal conductivity, Btu/hr · ft · °F
AKWTBL(20)	BOUND		input table of wall metal thermal conductivity, Btu/hr · ft · °F, versus temperature, °F
ALABL(7)		PLOTMF	array containing time and date label for identification of output plots
ALPH(12)		NTTACT	alphameric array used to uniquely identify output of each job
ALPHA	FRIC		constant used in friction factor calculations
ALPH2(4)		PLOTMF TCOEF NTTACT	time and date information, generated in NTTACT and passed to plotting subroutine as argument
AM		HCOOL	exponent on Reynolds number in Kercher-Tabakoff impingement correlation
AMC(20)		PLNUM	Mach number distribution in coolant plenum for a given slice
AMCHOK		FLows	if any stations have a Mach number greater than 1.0, the value is saved in this variable and returned as an argument, to be printed by TCOEF
AMIN		FLows HCPINS	area of coolant-flow channel at a given station, reduced by pin-fin blockage

Variable	Common	Subroutine	Definition
AM2(80)	TCO		array containing square of coolant-channel Mach number at each station, for a given slice
APG		PREP	intermediate value of hot-gas-side pressure, lbf/in ² , used for interpolating in input table during transient
APLEN		GETIN	input value of coolant-plenum area for given slice, cm ² (in ²)
APLN(15)	RADL		internal array to store plenum area for each slice, in ²
AP1		GASTBL	interpolating factor in gas property table lookup
AP2		GASTBL	1.0 - AP1
AQG		PREP	intermediate value of hot-gas-side heat flux, Btu/hr · ft ² , used for interpolating in input table during transient
ASTG		TCOEF	inner-surface area under stagnation-point impingement jet, in ²
ATG		PREP	intermediate value of hot-gas-side temperature, °R, used for interpolating in input table during transient
ATMAXP		PLOTMF	adjusted maximum temperature, °F, used as high endpoint on output plots
ATMINP		PLOTMF	adjusted minimum temperature, °F, used as low endpoint on output plots
ATYME		PLOTMF	value of time in transient, sec, used on output plots for identification
AVRGA		PARRAY	area ratio used in momentum equation at entrance to trailing edge
AZ		PLNUM	dummy variable, used as either diameter-area ratio or flow adjustment

Variable	Common	Subroutine	Definition
A1		FLAWS	interpolating factor in friction factor calculation in transitional Reynolds number range
A1		TARRAY	upstream half of inside-wall heat-transfer area, in^2 , associated with coolant-channel node
A2		FLAWS	interpolating factor in friction factor calculation in transitional Reynolds number range
A2		TARRAY	downstream half of inner surface heat-transfer area, in^2 , associated with coolant-channel node
A3		TARRAY	same as A1, but on opposite wall, only used in trailing-edge region
A4		TARRAY	same as A2, but on opposite wall, only used in trailing-edge region
B		GETIN	ratio of length to thickness, used along with AA to calculate interpolated values of TDLX(2), TDLX(3), and TDLX(5)
B(20)		PLNUM	spanwise static-temperature distribution, $^{\circ}\text{R}$, in coolant plenum for given slice
BC		GETIN	NAMELIST name
BCHGP(1000)	BOUND		input table of hot-gas, pressure-side heat-transfer coefficients, $\text{W}/\text{m}^2 \cdot \text{K}$ ($\text{Btu}/\text{hr} \cdot \text{ft}^2 \cdot ^{\circ}\text{F}$)
BCHGS(1000)	BOUND		input table of hot-gas, suction-side heat-transfer coefficients, $\text{W}/\text{m}^2 \cdot \text{K}$ ($\text{Btu}/\text{hr} \cdot \text{ft}^2 \cdot ^{\circ}\text{F}$)
BCPGP(1000)	BOUND		input table of hot-gas, pressure-side relative static pressure, kPa (lbf/in^2)
BCPGS(1000)	BOUND		input table of hot-gas, suction-side relative static pressure, kPa (lbf/in^2)

Variable	Common	Subroutine	Definition
BCQGP(1000)	BOUND		input table of hot-gas, pressure-side heat flux, W/m^2 (Btu/hr \cdot ft ²)
BCQGS(1000)	BOUND		input table of hot-gas, suction-side heat flux, W/m^2 (Btu/hr \cdot ft ²)
BCTGP(1000)	BOUND		input table of hot-gas, pressure-side temperature, K ($^{\circ}$ F)
BCTGS(1000)	BOUND		input table of hot-gas, suction-side temperature, K ($^{\circ}$ F)
BCTIME(50)	BOUND		input table of time at which transient input tables are specified, sec
BCXP(400)	BOUND		input table of outer-surface, pressure-side locations at which hot-gas conditions are input, cm (in.)
BCXS(400)	BOUND		input table of outer-surface, suction-side locations at which hot-gas conditions are input, cm (in.)
BES		HCOOL	equivalent slot width, in., used in leading-edge impingement correlation
BETA	FRIC		constant used in friction factor calculations
BETA1		PLNUM	square of pressure at inlet to coolant plenum for given slice, $(\text{lb}/\text{in}^2)^2$
BETTA(20)		PLNUM	spanwise static-pressure distribution in coolant plenum, lb/in^2
BTA	TCO		indicates type of hot-gas boundary condition
C		FLOWS GASTBL HCFRCD HCOOL HCPINS PLNUM TARRAY	gas thermal conductivity, Btu/hr \cdot ft \cdot $^{\circ}$ F

Variable	Common	Subroutine	Definition
CD	TCO		impingement-jet discharge coefficient
CDEN(2)	UNITS		conversion factor for density units
CD1(200)		NTTACT	dummy variable used to print selected intermediate temperature values
CEXCSW		NTTACT	amount of excess coolant flow, in SI units, kg/hr
CGASC(2)	UNITS		conversion factor for gas constant
CH(15)		PLNUM	coolant-channel choking indicator
CHANL(8000)	SPECL		array for storing input data
CHANLS		GETIN	NAMELIST name
CHFLX(2)	UNITS		conversion factor for heat-flux units
CHTC(2)	UNITS		conversion factor for heat-transfer-coefficient units
CIMP1	IMPCOR		user-supplied constants for general impingement correlation
CIMP2			
CIMP3			
CIMP4			
CIMP5			
CIMP6			
CIMP7			
CINCH(2)	UNITS		conversion factor for length units
CMSFL(2)	UNITS		conversion factor for mass flow rate units
CNUM(80)	TCO		number of impingement jets at each station for given slice
CONDCT		HCOOL	coolant-air thermal conductivity, Btu/hr · ft · °F
CONTRL		GETIN	NAMELIST name
CP	TCO		gas specific heat at constant pressure, Btu/lbm · °F

Variable	Common	Subroutine	Definition
CPC(80)	PRPS		coolant specific heat at constant pressure at each coolant node for given slice, Btu/lbm · °F evaluated at a mean temperature between bulk coolant temperature and wall temperature
CPIM		NTTACT PLOTMF	mean impingement-plenum pressure for given slice, in SI units, kPa
CPM		FLows	hot-gas-stream specific heat at constant pressure, Btu/lbm · °F
CPO	PRPS		specific heat at constant pressure, Btu/lbm · °F, evaluated at impingement-jet supply temperature
CPRSR(2)	UNITS		conversion factor for pressure units
CRHOVG(2)	UNITS		conversion factor for density × velocity units
CRITR		FLSPLT	coolant flow-split convergence criterion
CSPHT(2)	UNITS		conversion factor for specific-heat units
CTCON(2)	UNITS		conversion factor for thermal conductivity units
CTMPF(2)	UNITS		conversion factor for temperature units
CT0G		NTTACT	mean impingement-plenum static temperature for given slice, in SI units, K
CURV		TARRAY	factor to account for wall curvature in heat-conduction equations
CVISC(2)	UNITS		conversion factor for viscosity units
CWPLEN		NTTACT	coolant-plenum flow rate at entrance to given slice, in SI units, kg/hr
CWUSED		NTTACT	total amount of coolant air used, in SI units, kg/hr
CX		PLNUM	function of isentropic exponent k , $-(k + 1)/[2(k - 1)]$

Variable	Common	Subroutine	Definition
C1		PLNUM	function of isentropic exponent k , $2k/(k - 1)$
C3		PLNUM	computed constant involving wheel speed and isentropic exponent
C3		FLAWS	ratio of specific heats at constant pres- sure, coolant to hot gas
C5		PLNUM	computed constant involving isentropic exponent and gas constant
C6		PLNUM	function of isentropic exponent k , $(k - 1)/2$
C7		PLNUM	computed constant involving isentropic exponent and gas constant
C8		PLNUM	computed constant involving isentropic exponent and gas constant
D		PLNUM	convergence parameter in coolant- plenum pressure calculations
DD		PLNUM	coolant-plenum hydraulic diameter, in
DEH		HCOOL	hydraulic diameter of equivalent slot, in., used in leading-edge impingement correlation
DELAST		FLSPLT	variable used to save flow-split fraction at which pressure-match parameter, EPSN, changes sign
DELTA	FRIC		constant used in friction factor calcula- tion
DELTAN(15)		FLAWS FLSPLT HCPINS TARRAY TCOEF WROUT	fraction of stagnation-point impingement- jet flow that splits to suction-side coolant-flow channel for each slice
DELTAO		FLSPLT	value of DELTAN from previous flow- split iteration

Variable	Common	Subroutine	Definition
DENOM		NTTACT	intermediate variable used in time interpolation of some boundary conditions
DH(80)	TCO		coolant-channel hydraulic diameter at each station, in.
DHF(80)	TCO		effective diameter of film-cooling hole at each station, in., defined as hydraulic diameter of one hole multiplied by square root of number of holes at station
DHJ(80)	TCO		actual hydraulic diameter of an impingement hole at each station, in.
DHYD		GETIN	input value of coolant-plenum hydraulic diameter for a slice, cm (in.)
DIFN		TCOEF	pressure difference parameter used in checking convergence
DIFO		TCOEF	maximum pressure difference parameter used in checking convergence
DIFTOL		PLNUM	tolerance on coolant-plenum pressure-drop calculations
DIMP1	IMPCOR		user-supplied constants for leading-edge impingement correlation
DIMP2			
DIMP3			
DIMP4			
DIMP5			
DIMP6			
DLTAOP		FLSPLT	best value of DELTAN in the event of an unstable flow split
DLTYME	TRNSNT		time step used in transient calculations, sec
DLX(400)	TCO		chordwise distance from each node to adjacent upstream node, in.
DP(80)	PRPS		diameter of pin fins at each station, in.

Variable	Common	Subroutine	Definition
DPLN(15)	RADL		coolant-plenum hydraulic diameter for each slice, in.
DR		PLNUM	radial length increment in coolant-plenum calculations, in.
DR2		PLNUM	radial increment squared, in ²
DUMR1(80)	PRPS		dummy variable, not currently used
DUMR2(80)	PRPS		dummary variable, used to carry impingement-jet Reynolds number to output subroutine
DUMTER		PARRAY	intermediate variable in momentum equation involving coolant dumped directly into trailing edge
DUM1(10)		INPRT WROUT	dummy variables used to print input listings and program output
DUM2(10)		INPRT WROUT	
DUM3(10)		INPRT	
DUM4(10)			
DUM5(10)			
DUM6(10)			
DUM7(10)			
DUM8(10)			
DUM9(10)			
DUM10(10)			
DUM11(10)			
DUM12(10)			
DUM13(10)			
DUM14(10)			
DUM15(10)			
DUM16(10)			

Variable	Common	Subroutine	Definition
DUM17(10)		INPRT	dummy variables used to print input listings and program output
DUM18(10)		↓	↓
DUM19(10)			
DUM20(10)			
DUM25(10)			
DUM52(10)			
DUM53(10)			
DUM55(10)			
DX		PLNUM	spanwise step size used in calculating coolant-plenum pressure and temperature distributions
DXTEMP		PLNUM	variable to temporarily hold DX
DX1		TARRAY	path length between midwall node and adjacent upstream midwall node, in.
DX10		TARRAY	path length between outer coating - wall junction node and adjacent downstream outer coating - wall junction node, in.
DX2		TARRAY	path length between midwall node and adjacent downstream midwall node, in.
DX3		TARRAY	path length between outer-surface node and adjacent upstream outer-surface node, in.
DX4		TARRAY	path length between outer-surface node and adjacent downstream outer-surface node, in.
DX5		TARRAY	path length between inner-surface node and adjacent upstream inner-surface node, in.
DX6		TARRAY	path length between inner-surface node and adjacent downstream inner-surface node, in.

Variable	Common	Subroutine	Definition
DX7		TARRAY	path length between coolant node and adjacent upstream coolant node, in.
DX9		TARRAY	path length between outer coating - wall junction node and adjacent upstream outer coating - wall junction node, in.
D1		PLNUM	computed constant used in coolant-plenum pressure equations to account for effect of pumping due to wheel rotation
D2		PLNUM	computed constant used in coolant-plenum temperature equations to account for effect of pumping due to wheel rotation
E		PLNUM	factor used in adjusting convergence rate in coolant-plenum calculations
EFAREA(80)		HCPINS TARRAY	effective area, in ² , for heat transfer at stations with pin fins, including pin-fin effectiveness for heat transfer
EFTVNS		HCPINS	pin-fin effectiveness
EMES(80)	FLMCOL		for film cooling, ratio of coolant mass flux to free-stream mass flux, multiplied by equivalent slot width
EML		HCPINS	term used in pin-fin effectiveness calculation
ENDEFF		TARRAY	term in heat-transfer equations to account for convection to rear edge of blade when heat-transfer coefficients are input
ENDFLX		TARRAY	term in heat-transfer equations to account for convection to rear edge of blade when heat flux is input
EPLAST		FLSPLT	variable used to save latest value of pressure-match parameter, EPSN

Variable	Common	Subroutine	Definition
EPS	FRIC		constant used in friction factor calculations
EPSMIN		FLSPLT	minimum value attained by pressure-match parameter, EPSN, for unstable flow split
EPSN		FLSPLT TCOEF	pressure-match parameter, defined as difference between suction- and pressure-side coolant-channel static pressures at end of insert, divided by suction-side coolant-channel static pressure
EPSO		FLSPLT	old value of pressure-match parameter, EPSN
ETAPRM		FLSPLT	film-cooling effectiveness based on ratio of enthalpy differences
EXCESW		NTTACT	amount of excess coolant flow, difference between inlet flow and that actually used, lbm/hr
FACTOR		TARRAY	special variable to adjust amount of energy carried in by an impingement jet for case of a calculation station adjacent to flow-split station
FF(80)	TCO		value of friction factor at each flow station
FILM		PARRAY	term to account for momentum carried off by film-cooling air
FILMW		TARRAY	total film-cooling flow from given coolant node
FLMEFF(80)	FLMCOL		film-cooling effectiveness based on ratio of temperature differences
FM		GAUSS	multiplying factor used in Gauss elimination scheme

Variable	Common	Subroutine	Definition
FUNP		PLNUM	statement function to calculate pressure difference in coolant plenum
FUNT		PLNUM	statement function to calculate temperature difference in coolant plenum
F1(20)		PLNUM	friction factor in coolant plenum
GAM	TCO		ratio of specific heats
GAMC(80)	PRPS		ratio of specific heats at each coolant-channel node
GAMO	PRPS		ratio of specific heats at coolant-supply conditions
GEO		GETIN	NAMELIST name
GG		HCOOL	mass flux ratio, coolant crossflow to impingement-jet flow
GI		HCOOL	momentum flux ratio, coolant crossflow to impingement-jet flow
GMASS		HCOOL	mass flux from row of leading-edge impingement holes
GS(200)	GAAS		table of gas properties
G1		PLNUM	computed constant in coolant-plenum calculations, involving flow rate, gas constant, and specific heat at constant pressure
G2		PLNUM	computed constant in coolant-plenum calculations, involving flow rate and gas constant
HBAR		WROUT	average coolant-side heat-transfer coefficient for given slice, $\text{W/m}^2 \cdot \text{K}$ ($\text{Btu/hr} \cdot \text{ft}^2 \cdot ^\circ\text{F}$)
HC(80)	TCO		coolant-side heat-transfer coefficients at each station for given slice, $\text{Btu/hr} \cdot \text{ft}^2 \cdot ^\circ\text{F}$

Variable	Common	Subroutine	Definition
HCAL (4)		INPRT	alphameric array containing labels identifying type of coolant-side heat transfer
HG (80)	TCO		hot-gas-side heat-transfer coefficient at each station for given slice, $\text{Btu/hr} \cdot \text{ft}^2 \cdot ^\circ\text{F}$
HSTGMX		TCOEF	maximum physically possible value of coolant heat-transfer coefficient under stagnation jet, $\text{Btu/hr} \cdot \text{ft}^2 \cdot ^\circ\text{F}$
HUB1		TARRAY	term in conduction equation to account for specified hub temperature
HUB3		TARRAY	term in conduction equation to account for specified hub heat flux
HX		TARRAY	multiplying factor on coolant heat-transfer coefficient, initialized to 1.0 but may be changed dynamically
HYCOS		HCPINS	hyperbolic cosine term
HYSIN		HCPINS	hyperbolic sine term
IADJIN	SPECL		input variable that indicates which coolant-plenum supply property is to be held fixed
ICLK		PARRAY	indicates which side of blade a given station is on: 0 if suction side, 1 if pressure side
ICHNL		INPRT PREP	slice number, carried through as argument
ICHOKE		FLOW PARRAY TCOEF	number of station that shows choked coolant flow
ICOMP		TARRAY	number of station adjacent to impingement flow-split station in pressure-side direction

Variable	Common	Subroutine	Definition
ICOMS		TARRAY	number of station adjacent to impingement flow-split station in suction-side direction
ICONV		FLSPLT TCOEF	indicator for convergence of flow-split iterations
ICOR	TCO		station at which use of impingement-with-crossflow correlation is to begin
IDELT		FLSPLT TCOEF WROUT	counter of number of flow-split iterations performed
IDN		PARRAY	downstream node number for coolant-channel pressure calculations
IDNS		PARRAY	downstream station number for coolant-channel pressure calculations
IDX		PARRAY	upstream node number for coolant-channel pressure calculations
IEND		GETIN	last point in CHANL array occupied by data for given slice
IFCP		FLOWS	indicator used in locating pressure-side film-cooling holes
IFCS		FLOWS	indicator used in locating suction-side film-cooling holes
IFILM	TCO		input indicator for film cooling
IFLU		PREP	coolant-channel node number
IFNL		PARRAY	number of coolant-channel nodes
IFNL		TCOEF	total number of stations, minus 1
IFSPLT		FLOWS	indicates in which direction film-cooling air flows from stagnation station
IGG(80)		HCOOL	array containing node numbers at which ratio of coolant crossflow to impingement-jet flow is out of Kercher-Tabakoff correlation range

Variable	Common	Subroutine	Definition
IGGC		HCOOL	counts number of entries in IGG array
IHC(80)	TCO		indicates type of coolant-side heat transfer at each station for given slice
IHCT		GETIN	input value of IHC for given station
IHUB	TCO		indicates type of boundary to be used at hub end of blade
II		HCOOL	coolant-channel node number
IIHCTZ		GETIN	locates IHC array in overall array INDCHN
ILEAD		HCOOL	last station in range of leading-edge impingement correlation
IMS		FLows	location of film-cooling hole preceding current station
INDCHN(2000)	SPECL		array for storing integer input data
INEDIT		GETIN INPRT	input variable to control listing of input data
INN		PREP	location of IHC data in INDCHN array
INSTRT		GETIN	starting point for storage of integer data in INDCHN array for given slice
INUM		NTTACT	number of stations on each side of blade
IN1		PREP	location of end of group of single-valued variables in INDCHN array
IPLOT	SPECL		input indicator to control plotting options
IPRES		WROUT	pressure-side, outer-surface node number
IPRSMN		WROUT	location of minimum outer-surface temperature on pressure side
IPRSMX		WROUT	location of maximum outer-surface temperature on pressure side

Variable	Common	Subroutine	Definition
IRE(80)		HCOOL	list of station numbers at which impingement-jet Reynolds number is out of Kercher-Tabakoff correlation range
IRL		PARRAY	coolant node number
ISBLOK	TCO		starting point in CHANL array of data for given slice
ISEN		TARRAY	indicates which side of blade station IS is on
ISENS		FLows	indicates which side of blade a given station is on
ISENS		TARRAY	indicates which side of blade a given trailing-edge region station is on
ISLICE	TCO		current slice number
ISTA		GETIN	input station number
ISTAT		WROUT	outer-surface node number for given station
ISTATD		WROUT	outer-surface node number immediately downstream of ISTAT
ISTB		GETIN	input station number
ISTRT		HCOOL	station at which use of Kercher- Tabakoff correlation begins
ISTRT		TCOEF	first station in trailing-edge region
ISUCMN		WROUT	location of minimum outer-surface tem- perature on suction side
ISUCMX		WROUT	location of maximum outer-surface tem- perature on suction side
ISUCT		WROUT	suction-side station number
ISUP		TARRAY	adjacent station, upstream of current station, IS
ISYM(5)		PLOTMF	data array containing plotting symbol codes

Variable	Common	Subroutine	Definition
ITDHFZ		GETIN	locates film-cooling-hole data in CHANL array for given slice
ITDHJZ		GETIN	locates impingement-hole data in CHANL array for given slice
ITDLXZ		GETIN	locates node spacing data in CHANL array for given slice
ITDPZ		GETIN	locates pin-fin diameter data in CHANL array for given slice
ITHKZ		GETIN	locates wall and channel thickness data in CHANL array for given slice
ITIP	TCO		indicates type of boundary to be used at tip end of blade
ITRBG		INPRT	first station in trailing-edge region
ITRBG		WROUT	first station in trailing-edge region
ITREO		WROUT	last outside node at trailing edge
ITRRZ		GETIN	locates radial position data in CHANL array for given slice
ITSPZ		GETIN	locates pin-fin spacing data in CHANL array for given slice
ITXNZ		GETIN	locates impingement-hole spacing data in CHANL array for given slice
IUNITS	UNITS		indicates system of units used for input data
IUNSTB		FLSPLT	indicates whether flow split is stable or not
IUP		PARRAY	upstream node number for coolant-channel pressure calculations
IUPS		PARRAY	upstream station number for coolant-channel pressure calculations
IVARS(12)		PLOTMF	array of integer plotting controls
IVERGE		TCOEF WROUT	pressure iteration loop counter

Variable	Common	Subroutine	Definition
IWR		GAUSS	control on debugging output of coefficient matrix
IWRITE	SPECL		input control on amount of printed output
IXAX		PLOTMF	logical variable with value .TRUE.
IYAX		PLOTMF	logical variable with value .FALSE.
I1		PREP	starting point in INDCHN array for integer data for given slice, also used as starting point for nodal data in CHANL array for given slice
I3		PREP	starting point in CHANL array for station data
JDIS		FLows	number of stations that impingement flow-split station is displaced from station 1
JHCAL		INPRT	indicates type of heat transfer at given station
JLSTM		THRCON	size of wall thermal conductivity tables
JNUMS		FLSPLT	indicates whether previous call to FLSPLT resulted in unstable flow split
JOUTRG		FLSPLT	indicates attempt to split more than 100 percent of flow to one side
JPIV		GAUSS	pivotal column in matrix to be reduced
JS		FLows FLSPLT HCOOL PARRAY TARRAY TCOEF WROUT	station number at impingement flow-split point

Variable	Common	Subroutine	Definition
JSENS		FLAWS GETIN FLSPLT PARRAY TARRAY TCOEF	indicates which side of blade impingement flow-split is on
JSGNCH		FLSPLT	indicates whether a sign change has occurred in EPSN
JSO (15)		TCOEF	array for saving converged-flow-split station number for each slice
JSOLDS(25)		FLSPLT	array to keep track of stations checked as flow-split stations
JTIMES		FLSPLT	indicates whether DELTAN is to be rough adjusted or fine tuned
K		GAUSS	total bandwidth of matrix to be solved
K		NTTACT	counter of number of overall coolant-flow iterations
KSIG		PLNUM	coolant-plenum iteration counter
L		TARRAY THRCON	midwall node number at given station
LCOOL		FLAWS HCFRCD HCOOL HCPINS TARRAY TCOEF WROUT	coolant-channel node number at given station
LCOOLP		HCPINS TARRAY	inner-surface node across coolant-channel from given station
LCUP		HCPINS TARRAY	coolant-channel node number upstream of given station
LCUPP		TARRAY	inner-surface node across coolant channel and upstream of given station

Variable	Common	Subroutine	Definition
LCUPS		TARRAY	inner-surface node upstream of given station
LDN		TARRAY	midwall node number downstream of given station
LIN		FLAWS HCFRCD HCOOL HCPINS TARRAY	inner-surface node number at given station
LJ		INPRT TARRAY THRCON	node number at junction of outer coating and wall metal at given station
LOUT		TARRAY THRCON	wall outer-surface node number at given station
LSP		PREP	starting point in BCXP array of data for given slice
LSS		PREP	starting point in BCXS array of data for given slice
LUP		TARRAY	midwall node number upstream of given station
MACH1		PLNUM	indicator to keep track of step-size change
MD1	SPECL		indicator to control special condensed, on-line output
MD2	SPECL		indicator that job is complete and summary plots are to be produced
MD3	SPECL		plot counter
MNBC		INPRT	maximum of NBCS and NBCP
N		GAUSS	number of rows in matrix to be solved
NAG		PLNUM	indicator whether calculations have progressed beyond initial station

Variable	Common	Subroutine	Definition
NBCP	BOUND		input number of boundary condition points on pressure side
NBCS	BOUND		input number of boundary condition points on suction side
NBFRP		INPRT	number of pressure-side boundary condition points preceding data for given slice at given time
NBFRS		INPRT	number of suction-side boundary condition points preceding data for given slice at given time
NBLKSZ	TCO		size of data block in CHANL array for given slice
NCC		PLNUM	loop counter
NCHAR		NTTACT	number of characters in ALPH2 array
NCOOL		PLOTMF	coolant node number
NEND		HCOOL	end of region that uses leading-edge impingement correlation
NFC		FLAWS	number of station containing film-cooling holes
NFCSUP(80)	FLMCOL		array identifying node supplying film cooling to each downstream node
NFLUID(200)		INPRT	array of coolant-channel node numbers for each station
NFWD	TCO		number of stations in forward region
NG	GAAS		number of temperature entries in gas property table, GS
NGEO		GETIN	number of NAMELISTs /GEO/ to be read in
NINTRV		PLOTMF	number of temperature intervals in summary plots
NIT		TCOEF	counter of number of overall coolant-flow iterations

Variable	Common	Subroutine	Definition
NL		INPRT	output line counter
NLBLS		PLOTMF	number of points at which symbols are to be plotted
NMM		PLOTMF	midwall node number
NMW		NTTACT	outer-surface node number
NODM		WROUT	midwall node
NODOUT		GETIN	outer-surface node
NODSF		FLows GETIN INPRT PREP FLSPLT PARRAY TARRAY TCOEF	number of nodes in forward region
NODST		GETIN INPRT PREP PARRAY TARRAY TCOEF NTTACT	total number of nodes for given slice
NODSTM		INPRT	total number of nodes minus 4
NOS		FLows INPRT WROUT PLOTMF	outer-surface node number
NPRCP		INPRT	number of points in each pressure-side boundary condition array for times preceding current time
NPRCS		INPRT	number of points in each suction-side boundary condition array for times preceding current time

Variable	Common	Subroutine	Definition
NPRTTP		INPRT	number of points in each pressure-side boundary condition array per time step
NPRTS		INPRT	number of points in each suction-side boundary condition array per time step
NPTS		PLOTMF	number of points on given plot
NROW		GAUSS	number of matrix row to be displayed by debug output
NSAVE		TCOEF	coolant node number just upstream of exit, location of TSAVE
NSLICE	TCO		current slice number
NSTA	TCO		number of stations per slice
NSTAPS		PLOTMF	number of stations on each side of blade
NSTNS		PLNUM	number of spanwise stations per slice in coolant plenum
NTBC		GETIN	number of entries in input BCTIME array
NTIMES		INPRT	number of entries in BCTIME array
NTTG		PREP NTTACT	time step number
NTYM		NTTACT	number of time steps in transient
NUMS		FLSPLT	counter to force at least four attempts at a good flow split
P(2, 15, 80)	TCO		pressure at each node, for two consecutive time steps, lbf/in ²
PAVG		FLAWS	coolant-channel static pressure, lbf/in ² , used in calculating impingement hole flow rates
PBAR		FLAWS	pressure used in calculating square of coolant-channel Mach number

Variable	Common	Subroutine	Definition
PCNVRG		TCOEF	pressure-difference convergence criterion
PD		FLows GASTBL HCFRCD HCOOL HCPINS PLNUM TARRAY	Prandtl number
PDTOG		HCOOL	Prandtl number based on coolant-supply temperature
PEX(400)	BOUND		input array containing tables of static pressure at trailing-edge coolant exhaust, lbf/in^2
PEXC		INPRT	static pressure at trailing-edge coolant exhaust in SI units, kPa, for given slice
PEXIT(15)	TCO		static pressures at trailing-edge coolant exhaust for each slice at given time, lbf/in^2
PEXOLD(15)		TCOEF	saved value of exhaust static pressure, lbf/in^2 , used in setting initial guess of pressure distribution for subsequent time step
PEXTT		PLNUM	total pressure at exit of coolant plenum for given slice, lbf/in^2
PG(80)	FLMCOL		array containing hot-gas-side static pressure, lbf/in^2 , at each station
PI		HCOOL	constant, 3.14159
PIM	TCO		impingement-supply pressure, lbf/in^2
PIMOLD(15)		TCOEF	saved value of impingement-supply pressure, lbf/in^2 , for each slice

Variable	Common	Subroutine	Definition
PIN(15)	RADL		coolant total pressure, lbf/in ² , at entrance to each slice
PINS		HCPINS TARRAY	number of pin fins at given station
PIVOT		GAUSS	main diagonal term of row of matrix being solved
PLEGN(5)		PLOTMF	alphameric array to label pressure-data plots
PLTYME(2)		PLOTMF	alphameric variable to print transient time on each plot
POLD(15, 80)		TCOEF	saved values of coolant-channel pressure, lbf/in ² , from previous iteration
PP		PLNUM	intermediate pressure term
PPLEN		NTTACT	impingement-supply pressure, lbf/in ²
PROD		HCOOL	intermediate calculation result
PROPS		GETIN	NAMELIST name
PSAV(5)		TCOEF	array to save last four values of pressure at flow-split station, used to check convergence
PTEMP		PLNUM	intermediate pressure term
PTEXTIT		PLNUM	coolant-plenum total pressure, lbf/in ² : entrance value going into subroutine, exit value coming out
PTIN		NTTACT	coolant-supply pressure for a given time, lbf/in ²
PTIO(50)	BOUND		input array of coolant-supply pressure, kPa (lbf/in ²), as function of time, sec
PTIOC		INPRT	initial coolant-supply pressure in SI units, kPa
PTNOLD		NTTACT	previous value of PTIN, lbf/in ²
PT1		PLNUM	calculated coolant-plenum inlet total pressure, lbf/in ²

Variable	Common	Subroutine	Definition
PUMP(80)	TCO		term to account for coolant pumping due to wheel rotation
PUMTRM		PARRAY	term to account for coolant pumping due to wheel rotation
PXX		PLNUM	average static pressure, lbf/in ² , in coolant plenum for given slice
QG(80)	TCO		hot-gas heat flux to blade at each station, Btu/hr · ft ²
QHUB(80)	BOUND		heat flux conducted to blade wall from hub platform at each station, Btu/hr · ft ²
QHUBIN(400)	BOUND		input table of hub heat flux at each station as function of time, W/m ² (Btu/hr · ft ²)
QSNK(80)	TCO		term to account for heat removal from wall by film-cooling flow through wall
QTIP(80)	BOUND		heat flux from blade wall at tip for each station, Btu/hr · ft ²
QTIPIN(400)	BOUND		input table of tip heat flux at each station as function of time, W/m ² (Btu/hr · ft ²)
R	TCO		gas constant; value for air is build in, 53.35 ft-lbf/lbm · °R
RATIO		THRCON	interpolating fraction
RCHRD		TARRAY	dimensionless ratio of time increment to chordwise length increment squared at each station
RCHRDM		TARRAY	maximum value of RCHRD for a given slice
RCVRY		TARRAY	recovery factor
RE(80)	PRPS		coolant-channel Reynolds number at each station

Variable	Common	Subroutine	Definition
REFC(80)	FLMCOL		film-cooling flow Reynolds number at each station
REJ(80)		HCOOL	impingement-jet Reynolds number at each station
REJOVR(80)		HCOOL	array to save values of impingement-jet Reynolds number that are out of range of correlation
REY		PLNUM	coolant-plenum Reynolds number based on hydraulic diameter
RHOBAR		TARRAY	mean density in coolant channel, lbm/in^3
RHOC	TRNSNT		input density of outer coating, kg/m^3 (lbm/ft^3)
RHOM	TRNSNT		input density of wall metal, kg/m^3 (lbm/ft^3)
RHOVG(400)	BOUND		input table of hot-gas-side, free-stream mass velocity at each station as function of time, $\text{kg/m}^2 \cdot \text{sec}$ ($\text{lbm/ft}^2 \cdot \text{sec}$)
RHOVGA(80)	FLMCOL		hot-gas-side, free-stream mass velocity at each station for given slice, $\text{lbm/ft}^2 \cdot \text{sec}$
RI		GETIN	input value of radial location of coolant-plenum inlet for given slice, cm (in.)
RIN(15)	RADL		table of RI values for each slice, in.
RO		GETIN	input value of radial location of coolant-plenum exit for given slice, cm (in.)
ROINVC		HCOOL	intermediate term in impingement correlation, ft^3/lbm
ROINVJ		HCOOL	intermediate term in impingement correlation, ft^3/lbm
ROOT		PARRAY	intermediate term in pressure calculations

Variable	Common	Subroutine	Definition
ROUT(15)	RADL		table of RO values for each slice, in.
RR(80)	TCO		mean radial location of each station for a given slice
RRP		PLNUM	radial location, in.
RTEMP		PLNUM	radial location, in.
RTNARR(2)		PLOTMF	array containing maximum and minimum values of plot variables
RTRNV		TARRAY	dimensionless ratio of time increment to through-the-wall length increment squared
RTRNVM		TARRAY	maximum value of RTRNV for given slice
S(15)	TCO		span of each slice, in.
SEGMTS		PLNUM	number of segments in coolant plenum for given slice
SIGB		PLNUM	dummy variable used in coolant-plenum calculations
SIGC		PLNUM	dummy variable used in coolant-plenum calculations
SIGMA(20)		PLNUM	coolant velocity distribution in coolant plenum
SLEGN(5)		PLOTMF	alphameric array to label suction-side plots
SLP		HCPINS	mean pin-fin length at given station, in.
SP(80)	PRPS		pin-fin spacing at each station, in.
SPAN	TCO		radial span of given slice, in.
SPANC		INPRT	radial span of given slice in SI units, cm
SPHTC	TRNSNT		input specific heat of outer coating, J/kg · K (Btu/lbm · °F)
SPHTM	TRNSNT		input specific heat of wall metal, J/kg · K (Btu/lbm · °F)

Variable	Common	Subroutine	Definition
ST		HCOOL	Stanton number calculated from user-supplied impingement correlation
STANMX		HCOOL	Stanton number calculated from leading-edge impingement correlation
SV(3)		PLNUM	array to save values of SIGC
SYMBL(10)		PLOTMF	array of integers to be used as plot symbols
SYMBOL		PLOTMF	particular entry from SYMBL array
T(2, 15, 400)	TCO		calculated temperature at each node for each slice for two time steps, °F
TABOVE		TARRAY	midwall temperature at given station in slice above current slice, °F
TAU(400)	TCO		array of thickness values, in.
TBAR		FLAWS	coolant temperature, °R, used to calculate Mach number
TBAR		HCPINS	ratio of temperature drops in pin fins, pressure-side wall temperature minus mid-coolant-channel temperature to suction-side wall temperature minus mid-coolant-channel temperature
TBAR		WROUT	mean outer-surface temperature for given slice, °F
TBARMD		WROUT	mean midwall temperature, °F
TBELOW		TARRAY	midwall temperature at given station in slice below current slice, °F
TBULK		WROUT	overall blade bulk-metal temperature, °F
TC		THRCON	mean temperature of blade cladding material, °F
TCIN		NTTACT	coolant temperature, °F
TCOF(400, 30)	MATRX		array of coefficients to be solved for temperature or pressure

Variable	Common	Subroutine	Definition
TDHF		GETIN	function of film-cooling-hole size and spacing
TDHJ		GETIN	hydraulic diameter of impingement hole
TDLX(5)		GETIN	array containing lengths from nodes at upstream station to corresponding nodes at current station
TDP		GETIN	input pin-fin diameter, cm (in.)
TEM		INPRT	coolant-inlet absolute temperature, K ($^{\circ}$ R)
TEPS	TRNSNT		factor used to define time mean properties
TERM		FLSPLT	adjustment to flow-split parameter
TG(80)	TCO		hot-gas reference temperature at each station for given slice, $^{\circ}$ R
THETA1		TARRAY	intermediate terms in nodal energy equations
THETA2			
THETA3			
THETA4			
THETA5			
THETA6			
THETA8			
THETA9			
THK(3)		GETIN	input array of thickness values, cm (in.)
THUB(80)	BOUND		specified temperature at each blade hub station for given time, $^{\circ}$ F
THUBIN(400)	BOUND		input table of hub temperatures at each station as function of time, K ($^{\circ}$ F)
TIKLE(30)		GETIN	blank alphameric array used to initialize title array

Variable	Common	Subroutine	Definition
TIN(15)	RADL		inlet total temperature in coolant plenum for each slice, °F
TIP1		TARRAY	term in conduction equation to account for specified tip temperature
TIP3		TARRAY	term in conduction equation to account for specified tip heat flux
TITL		GETIN	NAMELIST name
TITLE(30)	SPECL		alphameric array of title information from input
TLABL1(21) TLABL2(9)		PLOTMF	alphameric arrays used to put input title on plots
TMAXP		PLOTMF	maximum pressure-side temperature to be plotted
TMAXS		PLOTMF	maximum suction-side temperature to be plotted
TMFRAC		PREP	time-interpolating function
TMINP		PLOTMF	minimum pressure-side temperature to be plotted
TMINS		PLOTMF	minimum suction-side temperature to be plotted
TMP		GASTBL	temperature used to determine gas properties, °R
TMP1		GASTBL	temperature used to determine gas properties, °F
TOTSPN		WROUT	total span of blade, in.
TP		PLNUM	intermediate temperature variable
TPLEN		NTTACT	mean impingement-plenum static temperature, °F
TPM(500)		PLOTMF	table of pressure-side, midwall temperatures for summary plots, K (°F)
TPMAX		WROUT	maximum pressure-side, outer-surface temperature for given slice, K (°F)

Variable	Common	Subroutine	Definition
TPMIN		WROUT	minimum pressure-side, outer-surface temperature for given slice, K ($^{\circ}$ F)
TPO(500)		PLOTMF	table of pressure-side, outer-surface temperatures for summary plots, K ($^{\circ}$ F)
TREDGE		TARRAY	intermediate term in nodal energy equation in trailing-edge region
TREPS		PARRAY TARRAY	same as TEPS
TRR		GETIN	input mean radial location of given station, cm (in.)
TRTRM		PARRAY	intermediate transient term in pressure equations
TRTRMC		TARRAY	intermediate transient term involving outer coating
TRTRMG		TARRAY	intermediate transient term involving coolant
TRTRMJ		TARRAY	intermediate transient term for coolant channel at entrance to trailing edge
TSAVE		TCOEF	temperature in coolant channel, just upstream of exit
TSM(500)		PLOTMF	table of suction-side, midwall temperature for summary plots, K ($^{\circ}$ F)
TSMAX		WROUT	maximum suction-side, outer-surface temperature for given slice, K ($^{\circ}$ F)
TSMIN		WROUT	minimum suction-side, outer-surface temperature for given slice, K ($^{\circ}$ F)
TSO(500)		PLOTMF	table of suction-side, outer-surface temperatures for summary plots, K ($^{\circ}$ F)
TSP		GETIN	input pin-fin spacing, cm (in.)
TTEMP		PLNUM	variable to save temperature value, $^{\circ}$ R

Variable	Common	Subroutine	Definition
TTEXT		PLNUM	coolant total temperature in plenum, $^{\circ}\text{F}$
TTIN		NTTACT	coolant-supply temperature, $^{\circ}\text{F}$, at entrance to coolant plenum for given time
TTIO(50)	BOUND		input table of coolant-supply temperature, K ($^{\circ}\text{F}$), as function of time
TTIP(80)	BOUND		table of blade tip temperature, $^{\circ}\text{F}$, for given time
TTIPIN(400)	BOUND		input table of blade tip temperature, K ($^{\circ}\text{F}$), as function of time
TTOTC(80)		TCOEF	coolant total temperature at each station for given slice, $^{\circ}\text{F}$
TTX		PLNUM	coolant total temperature at inlet to coolant plenum for given slice, $^{\circ}\text{R}$
TTYME		WROUT	current time in transient, sec
TT1(20)		PLNUM	total-temperature distribution, $^{\circ}\text{F}$, in coolant plenum
TW		THRCON	midwall temperature for evaluating thermal conductivity
TXN		GETIN	input spanwise spacing of impingement jets at given station, cm (in.)
TXX		PLNUM	average static temperature in coolant plenum for given slice, $^{\circ}\text{F}$
TYME	TRNSNT		time in transient calculations, sec
TYMMAX	TRNSNT		maximum time to which transient is carried, sec
T0G	TCO		impingement-jet temperature for given slice, $^{\circ}\text{R}$
T1		PLNUM	inlet total temperature in coolant plenum for given slice, $^{\circ}\text{R}$
UA(2)		INPRT	alphanumeric array containing area units

Variable	Common	Subroutine	Definition
UL(2)		INPRT	alphanumeric array containing length units
V		TCOEF	factor to accelerate convergence of pressure iterations
VARIB(15)		PLOTMF	alphanumeric array containing some plot labels
VAR5(12)		PLOTMF	array containing plotting controls
VDP		HCPINS	pin-fin diameter at given station, in.
VOLBAR		TARRAY	coolant-channel volume element at entrance to trailing-edge region, in ³
VSP		HCPINS	pin-fin spacing at given station, in.
V1		PLNUM	intermediate term in coolant-plenum calculations
W(15)	RADL		coolant flow-rate at entrance to each slice, lbm/hr
WC		HCOOL	absolute value of coolant flow-rate, lbm/sec
WCHK(80)	CHKHOL		alphanumeric variable used to indicate choked flow in impingement jets
WCHKDM	CHKHOL		alphanumeric variable used to indicate choked flow in holes dumping coolant to trailing-edge region
WCHOKE		PLNUM	coolant flow-rate at entrance to given slice, lbm/hr
WCR		FLows	critical flow-rate, lbm/sec
WCROS(2, 15, 80)	TCO		coolant-channel crossflow rate at each station for each slice for two time steps, lbm/sec
WDUMP	TCO		rate of coolant flow being dumped directly from plenum to trailing-edge region, lbm/sec
WFC(80)	TCO		film-cooling flow rate at each station for given slice, lbm/sec

Variable	Common	Subroutine	Definition
WFCDUM		FLows	intermediate variable in film-cooling flow rate calculation
WFCDUM		PARRAY	total film-cooling flow rate at given station, lbm/sec
WIM	TCO		total impingement-jet flow rate for given slice, lbm/sec
WJ(15,80)	TCO		impingement-jet flow rate for each station for each slice, lbm/sec
WPLEN	BOUND		input initial guess at total coolant flow, kg/hr (lbm/hr)
WPLENC		INPRT	total coolant flow in SI units, kg/hr
WPLENO		NTTACT	variable to save previous estimate of total coolant flow, lbm/hr
WS	RADL		rotor speed at given time, rpm
WSVST(50)	BOUND		input table of rotor speed, rpm, versus time, sec
WUSED		NTTACT	cumulative amount of coolant used, up to current slice, lbm/hr
WXCP		TARRAY	coolant flow-rate times specific-heat term
WXX		PLNUM	coolant flow-rate at entrance to given slice, lbm/hr
X(80)		TCOEF	coolant-channel node locations, in., used to set initial pressure distribution
XBAR		FLows	term in film-cooling effectiveness correlation
XCC		INPRT	coolant-channel distance from station 1 to given station, cm (in.)
XDUM		FLows	dummy variable used to save location of film-cooling hole

Variable	Common	Subroutine	Definition
XFC(80)	FLMCOL		distance from station with film-cooling holes to downstream stations without film-cooling holes, in.
XIS		INPRT	inside-wall surface distance from station 1 to given station
XJN		INPRT	distance along junction of cladding and wall metal from station 1 to given station, cm (in.)
XK(4)		PLNUM	pressure change in coolant plenum
XL		HCOOL	length of inner surface used in leading-edge impingement correlation, in.
XL(4)		PLNUM	temperature change in coolant plenum
XLABL(29)		PLOTMF	alphameric array of plot labels
XLABL2(15)		PLOTMF	alphameric array of plot labels
XLBL(20)		PLOTMF	array of x-coordinates to be plotted as slice numbers
XMM		INPRT	midwall distance from station 1 to given station, cm (in.)
XMU		FLOWS GASTBL HCFRCD HCOOL HCPINS PLNUM TARRAY	viscosity, lbm/ft · hr
XMUC(80)	FLMCOL		coolant viscosity, lbm/ft · hr, at each station, evaluated at mean temperature between inner-wall surface and bulk coolant temperatures
XMUM		FLOWS	hot-gas viscosity, lbm/ft · hr
XMUTOG		HCOOL	coolant viscosity based on coolant-supply temperature, lbm/ft · hr

Variable	Common	Subroutine	Definition
XN(80)	TCO		spanwise spacing of impingement holes at each station, in.
XNN		PLNUM	factor for increasing number of stations in coolant plenum
XOD		PREP	ratio of impingement-hole spacing to hydraulic diameter, at given station
XOS		INPRT	wall outer-surface distance from station 1 to given station, cm (in.)
XOVERD		HCOOL	ratio of impingement-hole spacing to hydraulic diameter, at given station
XOVR		HCPINS	location of zero temperature gradient in pin fins
XP		HCOOL	length of pressure-side inner-wall surface in leading-edge impingement region
XP(80)		PLOTMF	pressure-side, dimensionless distance along midwall plane from station 1 to each station
XP		PREP	distance of given pressure-side station from station 1, in.
XPF		PREP	interpolating fraction in BCXP table
XPL		PLOTMF	overall length along pressure-side, midwall plane, cm (in.)
XS		HCOOL	length of suction-side, inner-wall surface in leading-edge impingement region
XS(80)		PLOTMF	suction-side, dimensionless distance along midwall plane from station 1 to each station
XS		PREP	distance of given suction-side station from station 1, in.
XSF		PREP	interpolating function in BCXS table

Variable	Common	Subroutine	Definition
XSL		PLOTMF	overall length along suction-side, mid-wall plane, cm (in.)
XTEST		PLNUM	convergence test variable
XTOT		WROUT	overall outer-surface length around blade, in.
XTOTMD		WROUT	overall midwall length around blade, in.
XXN		PLNUM	number of spanwise stations per slice in coolant plenum
Y(320)		PLOTMF	array containing temperature values to be plotted
YCNVUU		TARRAY	indicates forced-convection heat transfer at last forward-region station on pressure side
YCONV		TARRAY	indicates forced-convection heat transfer at given station
YCONVU		TARRAY	indicates forced-convection heat transfer at station immediately upstream of given station
YFINS		TARRAY	indicates pin-fin heat transfer at given station
YFINSU		TARRAY	indicates pin-fin heat transfer at station immediately upstream of given station
YFNSUU		TARRAY	indicates pin-fin heat transfer at last forward-region station on pressure side
YIMP		TARRAY	indicates impingement heat transfer at given station
YIMPU		TARRAY	indicates impingement heat transfer at station immediately upstream of given station
YIMPUU		TARRAY	indicates impingement heat transfer at last forward-region station on pressure side

Variable	Common	Subroutine	Definition
YLABL (7)		PLOTMF	alphameric array for labeling plots
YLABL2(11)		PLOTMF	alphameric array for labeling plots
YLBL (20)		PLOTMF	array of coordinates of points to be plotted as slice numbers
YMAX		PLOTMF	maximum value of y-coordinates on plot
YMIN		PLOTMF	minimum value of y-coordinates on plot
YPLABL (10)		PLOTMF	alphameric array for labeling plots
YTEM (80)		PLOTMF	array to be plotted
ZED		PLNUM	coolant-plenum pressure-drop parameter for given slice
ZOVERD		HCOOL	ratio of coolant-channel width to impingement-hole hydraulic diameter
Z1 (15)		PLNUM	coolant-plenum pressure-drop parameter for each slice
Z3		PLNUM	intermediate term involving coolant flow
Z4		PLNUM	intermediate term involving coolant flow

PROGRAM LISTING

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C-----SOURCE.NTTACT---THIS IS THE MAIN PROGRAM.  BLOCK DATA SUBPROGRAM   NTTACT--0001
C          GASDAT MUST BE LOADED FIRST.                                     NTTACT--0002
C                                                                                   NTTACT--0003
C          TRANSIENT THERMAL ANALYSIS OF A COOLED TURBINE BLADE             NTTACT--0004
C          *           *           *           *                             NTTACT--0005
C          TACT1                                                             NTTACT--0006
C                                                                                   NTTACT--0007
C          COMMON /BOUND/ BCXS(400), BCXP(400), BCHGS(1000), BCHGP(1000), NTTACT--0008
Z          BCTGS(1000), BCTGP(1000), BCQGS(1000), BCQGP(1000), NTTACT--0009
Z          BCPGS(1000), BCPGP(1000), THUBIN(400), THUB(80), NTTACT--0010
Z          QHUBIN(400), QHUB(80), TTIPIN(400), TTIP(80), NTTACT--0011
Z          QTIPIN(400), QTIP(80), RHOVG(400), PEX(400), NTTACT--0012
Z          BCTIME(50), TTIO(50), PTIO(50), WPLEN, NTTACT--0013
Z          WSVST(50), AKCTBL(20), AKWTBL(20), NBCS, NBCP NTTACT--0014
C                                                                                   NTTACT--0015
C          COMMON /FLMCOL/ RHOVGA(80), PG(80), XPC(80), FLMEFF(80), NTTACT--0016
Z          XMUC(80), EMES(80), REFC(80), NFCSUP(80) NTTACT--0017
C                                                                                   NTTACT--0018
C          COMMON /GAAS/ GS(200), NG NTTACT--0019
C                                                                                   NTTACT--0020
C          COMMON /RADL/ APLN(15), DPLN(15), RIN(15), ROUT(15), NTTACT--0021
Z          PIN(15), TIN(15), W(15), WS NTTACT--0022
C                                                                                   NTTACT--0023
C          COMMON /SPECL/ CHANL(8000), TITLE(30), INDCHN(2000), NTTACT--0024
Z          IPLOT, MD1, MD2, MD3, IADJIN, IWRITE NTTACT--0025
C                                                                                   NTTACT--0026
C          COMMON /TCO/ ADUMP, BTA, CD, CP, NTTACT--0027
Z          GAM, PIM, R, SPAN, TOG, NTTACT--0028
Z          WDUMP, WIM, AKC(15,80), AKW(15,80), NTTACT--0029
Z          A(400), AJET(80), AM2(80), CNUM(80), NTTACT--0030
Z          DH(80), DHF(80), DHJ(80), NTTACT--0031
Z          DLX(400), FF(80), HC(80), HG(80), NTTACT--0032
Z          P(2,15,80), PEXIT(15), PUMP(80), QG(80), NTTACT--0033
Z          QSNK(80), RR(80), S(15), T(2,15,400), NTTACT--0034
Z          TG(80), TAU(400), WFC(80), NTTACT--0035
Z          WJ(15,80), WCROS(2,15,80), XN(80), NTTACT--0036
Z          ICOR, IFILM, IHUB, ITIP, NTTACT--0037
Z          ISBLOK, ISLICE, NBLKSZ, NSLICE, NTTACT--0038
Z          NFWD, NSTA, IHC(80) NTTACT--0039
C                                                                                   NTTACT--0040
C          COMMON /TRNSNT/ RHOC, RHOM, SPHTC, SPHTM, NTTACT--0041
Z          DLTME, TYME, TEPS, TYMMAX NTTACT--0042
C                                                                                   NTTACT--0043
C          COMMON /UNITS/ CINCH(2), CHTC(2), CHFLX(2), CPRSR(2), CMSFL(2), NTTACT--0044
Z          CTMPF(2), CTCON(2), CDEN(2), CSPHT(2), CGASC(2), NTTACT--0045
Z          CVISC(2), CRHOVG(2), IUNITS NTTACT--0046
C                                                                                   NTTACT--0047
C          DIMENSION DP(80), SP(80), ALPH(12), ALPH2(4), CD1(200) NTTACT--0048
C                                                                                   NTTACT--0049
C          TTIO = TOTAL TEMPERATURE OF BLADE COOLING AIR AT INLET NTTACT--0050
C          WPLEN = ESTIMATE OF COOLANT FLOW RATE - USED AS FIRST GUESS NTTACT--0051
C          PTIO = TOTAL PRESSURE OF BLADE COOLING AIR AT INLET NTTACT--0052
C          PEX = EXTERNAL GAS STREAM STATIC PRESSURE AT TRAILING EDGE NTTACT--0053
C                                                                                   NTTACT--0054
C          DATA ALPH/' THI','S JO','B WA','S ST','ARTE','D AT', NTTACT--0055
Z          ' ',' ','ON ',' ',' ',' ',' ','/ NTTACT--0056
C          DATA NCHAR/16/ NTTACT--0057
C                                                                                   NTTACT--0058
C          MD1 = 0 NTTACT--0059
C          MD2 = 0 NTTACT--0060

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TIME = -1.0	NTTACT--0061
DLTYME = 0.0	NTTACT--0062
C	NTTACT--0063
C TO GET AN ABBREVIATED OUTPUT OF MID-WALL TEMPERATURES AT THE TERMINAL	NTTACT--0064
C FOR EACH SLICE, ENTER:	NTTACT--0065
C AT TACT.50;SET TACT.MD1=1	NTTACT--0066
C	NTTACT--0067
MD3 = 0	NTTACT--0068
K = 1	NTTACT--0069
C	NTTACT--0070
C RECORD STARTING TIME, TO BE USED TO IDENTIFY MICROFILM PLOTS	NTTACT--0071
C	NTTACT--0072
CALL TIME(NCHAR,ALPH2)	NTTACT--0073
ALPH(7) = ALPH2(3)	NTTACT--0074
ALPH(8) = ALPH2(4)	NTTACT--0075
ALPH(10) = ALPH2(1)	NTTACT--0076
ALPH(11) = ALPH2(2)	NTTACT--0077
WRITE(6,425) (ALPH(I),I=1,12)	NTTACT--0078
WRITE(8,425) (ALPH(I),I=1,12)	NTTACT--0079
C	NTTACT--0080
C READ IN DATA	NTTACT--0081
C	NTTACT--0082
CALL GETIN(IWRITE,TYMMAX,WSVST,IADJIN)	NTTACT--0083
C	NTTACT--0084
C WRITE TITLE PAGE	NTTACT--0085
C	NTTACT--0086
WRITE(6,400)	NTTACT--0087
WRITE(6,425) (ALPH(I),I=1,12)	NTTACT--0088
WRITE(6,430) (TITLE(I),I=1,30)	NTTACT--0089
400 FORMAT(1H1,////////,50X,'***** OUTPUT *****',//////)	NTTACT--0090
425 FORMAT(/36X,12A4)	NTTACT--0091
430 FORMAT(//1X,30A4)	NTTACT--0092
C	NTTACT--0093
TTIN = TTIO(1)	NTTACT--0094
PTIN = PTIO(1)	NTTACT--0095
440 WPLENO = WPLEN	NTTACT--0096
PTNOLD = PTIN	NTTACT--0097
PTIO(1) = PTIN	NTTACT--0098
TYME = 0.0	NTTACT--0099
NTYM = 1	NTTACT--0100
IF (DLTYME.GT.0.) NTYM = TYMMAX/DLTYME + 1	NTTACT--0101
NODST = 5*NSTA	NTTACT--0102
C	NTTACT--0103
C	NTTACT--0104
C START MARCHING	NTTACT--0105
C	NTTACT--0106
DO 1100 ITYM = 1,NTYM	NTTACT--0107
ITYME = ITYM-1	NTTACT--0108
NTTG = ITYM	NTTACT--0109
TYME = ITYME*DLTYME	NTTACT--0110
IF (ITYM.EQ.1) TYME = -1.	NTTACT--0111
C	NTTACT--0112
C	NTTACT--0113
C	NTTACT--0114
C-- EVALUATE TIME DEPENDENT BOUNDARY CONDITIONS -----	NTTACT--0115
C -	NTTACT--0116
C	NTTACT--0117
PTIN = PTIO(1)	NTTACT--0118
IF (TYME.LT.0.0) GO TO 490	NTTACT--0119
C	NTTACT--0120

C-- LOCATE COOLANT SUPPLY PRESSURE FOR TYME	NTTACT--0121
C	NTTACT--0122
DO 450 I = 4,50,2	NTTACT--0123
PTIN = PTIO(I-3)	NTTACT--0124
IF (PTIO(I).LE.0.0) GO TO 460	NTTACT--0125
IPTIO = I-1	NTTACT--0126
IF (TYME.LE.PTIO(I).AND.TYME.GT.PTIO(I-2)) GO TO 455	NTTACT--0127
450 CONTINUE	NTTACT--0128
455 DENOM = PTIO(IPTIO+1)-PTIO(IPTIO-1)	NTTACT--0129
IF (DENOM.GT.0.) PTIN = PTIO(IPTIO-2) +	NTTACT--0130
Z (PTIO(IPTIO)-PTIO(IPTIO-2)) * (TYME-PTIO(IPTIO-1)) /DENOM	NTTACT--0131
460 CONTINUE	NTTACT--0132
C	NTTACT--0133
C-- LOCATE COOLANT SUPPLY TEMPERATURE FOR TYME	NTTACT--0134
C	NTTACT--0135
DO 470 I = 4,50,2	NTTACT--0136
TTIN = TTIO(I-3)	NTTACT--0137
IF (TTIO(I).LE.0.0) GO TO 490	NTTACT--0138
ITTIO = I-1	NTTACT--0139
IF (TYME.LE.TTIO(I).AND.TYME.GT.TTIO(I-2)) GO TO 475	NTTACT--0140
470 CONTINUE	NTTACT--0141
475 DENOM = TTIO(ITTIO+1)-TTIO(ITTIO-1)	NTTACT--0142
IF (DENOM.GT.0.) TTIN = TTIO(ITTIO-2) +	NTTACT--0143
Z (TTIO(ITTIO)-TTIO(ITTIO-2)) * (TYME-TTIO(ITTIO-1)) /DENOM	NTTACT--0144
490 CONTINUE	NTTACT--0145
C	NTTACT--0146
C LOCATE THE VALUE OF THE WHEEL SPEED FOR THE CURRENT TIME.	NTTACT--0147
C	NTTACT--0148
WS = WSVST(1)	NTTACT--0149
IF (TYME.LE.0.0) GO TO 530	NTTACT--0150
DO 510 I = 4,50,2	NTTACT--0151
WS = WSVST(I-3)	NTTACT--0152
IF (WSVST(I).LE.0.0) GO TO 530	NTTACT--0153
IWS = I-1	NTTACT--0154
IF (TYME.LE.WSVST(I).AND.TYME.GT.WSVST(I-2)) GO TO 520	NTTACT--0155
510 CONTINUE	NTTACT--0156
520 DENOM = WSVST(IWS+1) - WSVST(IWS-1)	NTTACT--0157
IF (DENOM.GT.0.0) WS = WSVST(IWS-2) +	NTTACT--0158
Z (WSVST(IWS)-WSVST(IWS-2)) * (TYME-WSVST(IWS-1)) /DENOM	NTTACT--0159
530 CONTINUE	NTTACT--0160
C	NTTACT--0161
C	NTTACT--0162
C LOCATE THE VALUE FOR PEXIT, GAS STATIC PRESSURE AT EXIT OF BLADE,	NTTACT--0163
C FOR THE CURRENT TIME AND ALL SLICES.	NTTACT--0164
C	NTTACT--0165
IF (TYME.GT.0.0) GO TO 533	NTTACT--0166
DO 532 I = 1,NSLICE	NTTACT--0167
PEXIT(I) = PEX(I)	NTTACT--0168
IF (PEX(I).LE.0.0) PEXIT(I) = PEX(1)	NTTACT--0169
532 CONTINUE	NTTACT--0170
533 CONTINUE	NTTACT--0171
IF (BCTIME(2).LE.0.0) GO TO 545	NTTACT--0172
DO 535 I = 2,50	NTTACT--0173
IPEX = I-1	NTTACT--0174
IF (TYME.LE.BCTIME(I).AND.TYME.GT.BCTIME(I-1)) GO TO 540	NTTACT--0175
535 CONTINUE	NTTACT--0176
540 DENOM = BCTIME(IPEX+1) - BCTIME(IPEX)	NTTACT--0177
IF (DENOM.EQ.0.0) GO TO 545	NTTACT--0178
TYMFRC = (TYME - BCTIME(IPEX)) /DENOM	NTTACT--0179
DO 542 I = 1,NSLICE	NTTACT--0180

	IC = (IPEX-1)*NSLICE + .I	NTTACT--0181
	PEXIT(I) = PEX(IC) + (PEX(IC+NSLICE)-PEX(IC))*TYMFRC	NTTACT--0182
542	CONTINUE	NTTACT--0183
	IF (IFILM.NE.2) GO TO 545	NTTACT--0184
C		NTTACT--0185
C--	SET INTERPOLATED VALUES OF FREE STREAM RHO*V FOR THIS TIME	NTTACT--0186
C		NTTACT--0187
	DO 543 I = 1,NSTA	NTTACT--0188
	IRO = (IPEX-1)*NSTA + I	NTTACT--0189
	IRN = IPEX*NSTA + I	NTTACT--0190
543	RHOVGA(I) = RHOVG(IRO) + TYMFRC*(RHOVG(IRN)-RHOVG(IRO))	NTTACT--0191
C		NTTACT--0192
C		NTTACT--0193
545	CONTINUE	NTTACT--0194
C		NTTACT--0195
C		NTTACT--0196
C--	SET TIME INTERPOLATED VALUES OF QHUB OR THUB AND QTIP OR TTIP.	NTTACT--0197
	IF (BCTIME(2).LE.0.0) GO TO 555	NTTACT--0198
	DO 550 I = 1,NSTA	NTTACT--0199
	IQO = (IPEX-1)*NSTA + I	NTTACT--0200
	IQN = IPEX*NSTA + I	NTTACT--0201
	IF (IHUB.EQ.1) THUB(I) = THUBIN(IQO) +	NTTACT--0202
Z	TYMFRC*(THUBIN(IQN)-THUBIN(IQO))	NTTACT--0203
	IF (IHUB.EQ.3) QHUB(I) = QHUBIN(IQO) +	NTTACT--0204
Z	TYMFRC*(QHUBIN(IQN)-QHUBIN(IQO))	NTTACT--0205
	IF (ITIP.EQ.1) TTIP(I) = TTIPIN(IQO) +	NTTACT--0206
Z	TYMFRC*(TTIPIN(IQN)-TTIPIN(IQO))	NTTACT--0207
	IF (ITIP.EQ.3) QTIP(I) = QTIPIN(IQO) +	NTTACT--0208
Z	TYMFRC*(QTIPIN(IQN)-QTIPIN(IQO))	NTTACT--0209
550	CONTINUE	NTTACT--0210
	GO TO 565	NTTACT--0211
C		NTTACT--0212
555	CONTINUE	NTTACT--0213
	DO 560 I = 1,NSTA	NTTACT--0214
	IF (IHUB.EQ.1) THUB(I) = THUBIN(I)	NTTACT--0215
	IF (IHUB.EQ.3) QHUB(I) = QHUBIN(I)	NTTACT--0216
	IF (ITIP.EQ.1) TTIP(I) = TTIPIN(I)	NTTACT--0217
	IF (ITIP.EQ.3) QTIP(I) = QTIPIN(I)	NTTACT--0218
560	CONTINUE	NTTACT--0219
C		NTTACT--0220
565	TCIN = TTIN	NTTACT--0221
	IF (ITYM.GT.1) WPLEN = WUSED*PTIN/PTNOLD	NTTACT--0222
570	WPLENO = WPLEN	NTTACT--0223
	PTNOLD = PTIN	NTTACT--0224
	WUSED = 0.0	NTTACT--0225
C		NTTACT--0226
C	CALCULATE TEMPERATURE AND PRESSURES FOR EACH SLICE OF THE BLADE	NTTACT--0227
C		NTTACT--0228
	DO 1000 I = 1,NSLICE	NTTACT--0229
	ISLICE = I	NTTACT--0230
C		NTTACT--0231
C	FIRST DETERMINE IMPINGEMENT PLENUM CONDITIONS	NTTACT--0232
C		NTTACT--0233
	CALL PLNUM(WPLEN,PPLEN,PTIN,TPLEN,TCIN)	NTTACT--0234
	TOG = TPLEN + 460.	NTTACT--0235
	PIM = PPLEN	NTTACT--0236
	IF (IUNITS.EQ.1) GO TO 860	NTTACT--0237
	WRITE(6,800) I,PIM,TOG	NTTACT--0238
800	FORMAT(1H2//10X,100('*'))//30X,'THE IMPINGEMENT PLENUM CONDITIONS'	NTTACT--0239
Z	' FOR SLICE NO.',I2,' ARE: '//60X,'PIM = ',F7.2,	NTTACT--0240


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      Z      ' PSIA,'//60X,'TOG = ',F7.2,' DEG. R'//10X,100('*'))      NTTACT--0241
C      IF (I.EQ.1) WRITE(6,850) WPLEN      NTTACT--0242
250  FORMAT(1H ,//30X,'CENTRAL PLENUM FLOW IS ',F6.1,' LBM/HR',//)      NTTACT--0243
      GO TO 890      NTTACT--0244
C      NTTACT--0245
860  CTOG = TOG/1.8      NTTACT--0246
      CPIM = PIM/CPRSR(1)      NTTACT--0247
      WRITE(6,870) I,CPIM,CTOG      NTTACT--0248
870  FORMAT(1H2//10X,100('*'))//30X,'THE IMPINGEMENT PLENUM CONDITIONS'      NTTACT--0249
      Z      ' FOR SLICE NO.',I2,' ARE: '//60X,'PIM = ',F7.2,      NTTACT--0251
      Z      ' KPA, '//60X,'TOG = ',F7.2,' K      '//10X,100('*'))      NTTACT--0252
      CWPLEN = WPLEN/CMSFL(1)      NTTACT--0253
      IF (I.EQ.1) WRITE(6,880) CWPLEN      NTTACT--0254
880  FORMAT(1H ,//30X,'CENTRAL PLENUM FLOW IS ',F6.1,' KG/HR',//)      NTTACT--0255
C      NTTACT--0256
890  CONTINUE      NTTACT--0257
C      NTTACT--0258
C      THEN COMPUTE TEMPERATURES AND PRESSURES      NTTACT--0259
C      NTTACT--0260
      CALL PREP(I,NTTG)      NTTACT--0261
C      NTTACT--0262
      CALL TCOEF(IWRITE,WS,K,IPLLOT,ALPH2)      NTTACT--0263
      IF (IPLLOT.GT.0) CALL PLOTMF(ALPH2)      NTTACT--0264
      IF (MD1.EQ.0) GO TO 975      NTTACT--0265
C      NTTACT--0266
C THIS BLOCK PRINTS SPECIAL CONDENSED OUTPUT TO THE TERMINAL IF MD1 > 0      NTTACT--0267
C      NTTACT--0268
      IC1 = 0      NTTACT--0269
      DO 955 II = 1,NSTA,2      NTTACT--0270
      IC1 = IC1 + 1      NTTACT--0271
      NMW = 5*II - 4      NTTACT--0272
955  CD1(IC1) = T(2,I,NMW) - 460.      NTTACT--0273
      DO 960 II = 2,NSTA,2      NTTACT--0274
      IC1 = IC1 + 1      NTTACT--0275
      NMW = 5*II-4      NTTACT--0276
960  CD1(IC1) = T(2,I,NMW) - 460.      NTTACT--0277
      WRITE(8,962) I,K      NTTACT--0278
962  FORMAT(/' BLADE SLICE ',I2,', OVERALL FLOW LOOP ',I2,      NTTACT--0279
      Z      ', SURFACE TEMPERATURE, (F), STARTING AT LEADING EDGE'//)      NTTACT--0280
      INUM = NSTA/2 + 1      NTTACT--0281
      WRITE(8,964) (CD1(II),II=1,INUM)      NTTACT--0282
964  FORMAT(' PRESSURE SIDE'/10(2X,F7.1))      NTTACT--0283
      INUM = INUM + 1      NTTACT--0284
      WRITE(8,966) CD1(1), (CD1(II),II=INUM,NSTA)      NTTACT--0285
966  FORMAT(/' SUCTION SIDE'/10(2X,F7.1))      NTTACT--0286
C      NTTACT--0287
C      NTTACT--0288
975  CONTINUE      NTTACT--0289
C      NTTACT--0290
C      CHECK HOW MUCH PLENUM FLOW IS LEFT      NTTACT--0291
C      NTTACT--0292
      WUSED = WUSED + 3600.*WIM      NTTACT--0293
      EXCESW = WPLEN - 3600.*WIM      NTTACT--0294
      IF (EXCESW.GT.0..AND.I.LT.NSLICE) WPLEN = EXCESW      NTTACT--0295
      IF (EXCESW.LT.0..AND.I.LT.NSLICE) WRITE(6,985) I      NTTACT--0296
985  FORMAT(/' RAN OUT OF MASS FLOW IN BRANCH NO. ',I2)      NTTACT--0297
1000 CONTINUE      NTTACT--0298
C      NTTACT--0299
C      NTTACT--0300

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1010	IF (IUNITS.EQ.2) WRITE(6,1010) WUSED	NTTACT--0301
	FORMAT(/30X,'AMOUNT OF COOLANT ACTUALLY USED AT THIS TIME'	NTTACT--0302
Z	' STEP IS ',F6.1,' LBM/HR')	NTTACT--0303
	CWUSED = WUSED/CMSFL(1)	NTTACT--0304
	IF (IUNITS.EQ.1) WRITE(6,1011) CWUSED	NTTACT--0305
1011	FORMAT(/30X,'AMOUNT OF COOLANT ACTUALLY USED AT THIS TIME'	NTTACT--0306
Z	' STEP IS ',F6.1,' KG/HR')	NTTACT--0307
C		NTTACT--0308
	DO 1040 I = 1,NSLICE	NTTACT--0309
	DO 1020 J = 1,NODST	NTTACT--0310
1020	T(1,I,J) = T(2,I,J)	NTTACT--0311
	DO 1040 J = 1,NSTA	NTTACT--0312
1040	P(1,ISLICE,J) = P(2,ISLICE,J)	NTTACT--0313
	IF (TYME.GT.0.0) GO TO 1100	NTTACT--0314
C		NTTACT--0315
C---	ADJUST COOLANT FLOW AND RECALCULATE TEMPERATURES, ETC. FOR STEADY	NTTACT--0316
C	STATE CASE OR TIME =0.0	NTTACT--0317
C		NTTACT--0318
	EXCESW = WPLENO - WUSED	NTTACT--0319
	IF (ABS(EXCESW).LT..01*WPLENO) GO TO 1100	NTTACT--0320
	IF (IADJIN.GT.0) GO TO 1050	NTTACT--0321
C		NTTACT--0322
C --->	NORMAL ADJUSTMENT IS ON WPLEN	NTTACT--0323
C		NTTACT--0324
	WPLEN = WPLENO - .995*EXCESW	NTTACT--0325
	K = K + 1	NTTACT--0326
	PTIN = PTNOLD	NTTACT--0327
	TCIN = TTIN	NTTACT--0328
	GO TO 570	NTTACT--0329
C		NTTACT--0330
C ---->	SPECIAL CASE, FOR IADJPT > 0, ADJUSTMENT IS ON PTIN	NTTACT--0331
C		NTTACT--0332
1050	PTIN = PEXIT(1) + (PTNOLD-PEXIT(1))*(WPLENO/WUSED)**1.6	NTTACT--0333
	WPLEN = WPLENO	NTTACT--0334
	TCIN = TTIN	NTTACT--0335
	K = K + 1	NTTACT--0336
	GO TO 570	NTTACT--0337
C		NTTACT--0338
1100	CONTINUE	NTTACT--0339
C		NTTACT--0340
C		NTTACT--0341
	IF (IUNITS.EQ.1) GO TO 3850	NTTACT--0342
3000	WRITE(6,3500) K,WPLENO	NTTACT--0343
3500	FORMAT(/,20X,80('-') ,/,23X,I2,' LOOP(S) ON INITIAL COOLANT FLOW'	NTTACT--0344
Z	' WERE USED. FINAL VALUE IS ',F7.2,' LB/HR')	NTTACT--0345
	WRITE(6,3600) EXCESW	NTTACT--0346
3600	FORMAT(5X,'RESIDUAL COOLING AIR FLOW IS ',F9.4,' LBM/HR',/	NTTACT--0347
Z	20X,80('-'))	NTTACT--0348
	WRITE(6,425) (ALPH(I),I=1,12)	NTTACT--0349
C		NTTACT--0350
	GO TO 3900	NTTACT--0351
C		NTTACT--0352
3860	CWPLEN = WPLENO/CMSFL(1)	NTTACT--0353
	CEXCSW = EXCESW/CMSFL(1)	NTTACT--0354
	WRITE(6,3870) K,CWPLEN	NTTACT--0355
3870	FORMAT(/,20X,80('-') ,/,23X,I2,' LOOP(S) ON INITIAL COOLANT FLOW'	NTTACT--0356
Z	' WERE USED. FINAL VALUE IS ',F7.2,' KG/HR')	NTTACT--0357
	WRITE(6,3880) CEXCSW	NTTACT--0358
3880	FORMAT(5X,'RESIDUAL COOLING AIR FLOW IS ',F9.4,' KG/HR',/	NTTACT--0359
Z	20X,80('-'))	NTTACT--0360

WRITE(6,425) (ALPH(I),I=1,12)	NTTACT--0361
C	NTTACT--0362
3900 CONTINUE	NTTACT--0363
MD2 = 1	NTTACT--0364
IF (NSLICE.GT.1.AND.IPLOT.GT.0) CALL PLOTMF(ALPH2)	NTTACT--0365
WRITE(6,425) (ALPH(I),I=1,12)	NTTACT--0366
STOP	NTTACT--0367
END	NTTACT--0368
C----SOURCE.NFLOEST	NFLOEST 0369
SUBROUTINE FLOWS(JS,DELTAN,ICHOKE,AMCHOK)	NFLOEST 0370
C	NFLOEST 0371
C=====	NFLOEST 0372
C	NFLOEST 0373
C- SOURCE.NFLOEST--	NFLOEST 0374
C	NFLOEST 0375
C THIS SUBROUTINE COMPUTES THE FOLLOWING---	NFLOEST 0376
C WJ, IMPINGEMENT JET FLOW RATES (LBM/SEC).	NFLOEST 0377
C WCROS, THE CHANNEL CROSSFLOWS (LBM/SEC).	NFLOEST 0378
C AM2, THE SQUARE OF THE CHANNEL MACH NUMBER.	NFLOEST 0379
C WDUMP, A FLOWRATE DUMPED DIRECTLY FROM CENTRAL PLENUM INTO TRAILING	NFLOEST 0380
C EDGE CHANNEL (LBM/SEC).	NFLOEST 0381
C WIM, THE TOTAL COOLANT FLOW USED FOR THIS SLICE (LBM/SEC).	NFLOEST 0382
C WFC, FILM COOLING HOLE FLOW RATES (LBM/SEC).	NFLOEST 0383
C FF, THE CHANNEL FRICTION FACTOR, EITHER FOR LAMINAR, TURBULENT, OR	NFLOEST 0384
C A PIN FIN ARRAY.	NFLOEST 0385
C FLMEFF, A FILM COOLING EFFECTIVENESS.	NFLOEST 0386
C	NFLOEST 0387
C=====	NFLOEST 0388
C	NFLOEST 0389
COMMON /CHKHOL/ WCHK(80), WCHKDM	NFLOEST 0390
C	NFLOEST 0391
COMMON /FLMCO/ RHOVGA(80), PG(80), XPC(80), FLMEFF(80),	NFLOEST 0392
Z XMUC(80), EMES(80), REFC(80), NFCSUP(80)	NFLOEST 0393
C	NFLOEST 0394
COMMON /FRIC/ ALPHA, BETA, DELTA, EPS	NFLOEST 0395
C	NFLOEST 0396
COMMON /PRPS/ CPO, GAMO, DP(80), SP(80), RE(80),	NFLOEST 0397
Z CPC(80), GAMC(80), DUMR1(80), DUMR2(80)	NFLOEST 0398
C	NFLOEST 0399
COMMON /TCO/ ADUMP, BTA, CD, CP, NFLOEST 0400	
Z GAM, PIM, R, SPAN, TOG, NFLOEST 0401	
Z WDUMP, WIM, AKC(15,80), AKW(15,80), NFLOEST 0402	
Z A(400), AJET(80), AM2(80), CNUM(80), NFLOEST 0403	
Z DH(80), DHF(80), DHJ(80), NFLOEST 0404	
Z DLX(400), FF(80), HC(80), HG(80), NFLOEST 0405	
Z P(2,15,80), PEXIT(15), PUMP(80), QG(80), NFLOEST 0406	
Z QSNK(80), RR(80), S(15), T(2,15,400), NFLOEST 0407	
Z TG(80), TAU(400), WFC(80), NFLOEST 0408	
Z WJ(15,80), WCROS(2,15,80), XN(80), NFLOEST 0409	
Z ICOR, IFILM, IHUB, ITIP, NFLOEST 0410	
Z ISBLOK, ISLICE, NBLKSZ, NSLICE, NFLOEST 0411	
Z NFW, NSTA, IHC(80), NFLOEST 0412	
C	NFLOEST 0413
COMMON /TRNSNT/ RHOC, RHOM, SPHTC, SPHTM, NFLOEST 0414	
Z DLTYME, TYME, TEPS, TYMMAX NFLOEST 0415	
C	NFLOEST 0416
DATA CHKD/'@'/, UNCHKD/' '/	NFLOEST 0417
C	NFLOEST 0418
DIMENSION DELTAN(15)	NFLOEST 0419
C	NFLOEST 0420

C FOLLOWING VARIABLES NEEDED TO CALCULATE FILM COOLING EFFECTIVENESS.	NFLOEST 0421
C THEY ARE TRANSMITTED THROUGH COMMON FLNCOL	NFLOEST 0422
C WHERE-	NFLOEST 0423
C PG IS GAS SIDE STATIC PRESSURE DISTRIBUTION; XFC IS THE	NFLOEST 0424
C DISTANCE A STATION IS DOWNSTREAM FROM THE NEAREST	NFLOEST 0425
C ROW OF FILM COOLING HOLES, (IN); FLMEFF IS THE CALCULATED	NFLOEST 0426
C FILM EFFECTIVENESS AT EACH STATION;	NFLOEST 0427
C XMUC IS COOLANT VISCOSITY BASED ON LOCAL COOLANT TEMPERATURE;	NFLOEST 0428
C EMES IS THE PRODUCT M*S, WHERE M IS THE BLOWING	NFLOEST 0429
C RATIO, AND S IS AN EQUIVALENT SLOT WIDTH; REFC IS THE FILM	NFLOEST 0430
C REYNOLDS NUMBER, BASED ON S; AND NFCSUP IDENTIFIES	NFLOEST 0431
C THE STATION NUMBER SUPPLYING FILM COOLING TO DOWNSTREAM STATIONS.	NFLOEST 0432
C	NFLOEST 0433
100 CONTINUE	NFLOEST 0434
C INITIALIZE HOLE CHOKING INDICATOR TO UNCHOKED	NFLOEST 0435
DO 101 I = 1, NSTA	NFLOEST 0436
101 WCHK(I) = UNCHKD	NFLOEST 0437
ICHOKE = 0	NFLOEST 0438
N = NSTA-1	NFLOEST 0439
C	NFLOEST 0440
C N = NODE NUMBER OF LAST FLOW CHANNEL NODE, AT EXIT OF TRAILING EDGE	NFLOEST 0441
C	NFLOEST 0442
C	NFLOEST 0443
C CALCULATE IMPINGEMENT FLOWS, AND FORWARD REGION FILM COOLING FLOWS	NFLOEST 0444
C	NFLOEST 0445
TMP = T0G	NFLOEST 0446
CALL GASTBL(TMP,C,CP,GAM,PD,R,XMU)	NFLOEST 0447
GAMO = GAM	NFLOEST 0448
CPO = CP	NFLOEST 0449
NODSF = 5*NFWD	NFLOEST 0450
C	NFLOEST 0451
PAVG = P(2,ISLICE,1)	NFLOEST 0452
WJ(ISLICE,1) = 0.0	NFLOEST 0453
IF (PAVG.GT.PIM) GO TO 120	NFLOEST 0454
WCR=CD*PAVG*AJET(1)/(R*T0G)*SQRT(64.4*GAMO*R*T0G/(GAMO+1.))*	NFLOEST 0455
Z (PIM/PAVG)**((GAMO-1.0)/GAMO)	NFLOEST 0456
WJ(ISLICE,1)=PAVG/(R*T0G)*AJET(1)*CD*	NFLOEST 0457
Z SQRT(64.4*GAMO*R*T0G/(GAMO-1.))* (1.-(PAVG/PIM)**((GAMO-1.)/GAMO))	NFLOEST 0458
1 *(PIM/PAVG)**((GAMO-1.0)/GAMO)	NFLOEST 0459
WFC(1) = 0.0	NFLOEST 0460
IF (P(2,ISLICE,1).GT.PG(1)) WFC(1) = CD*.25*3.1415926*(DHF(1)**2)	NFLOEST 0461
Z *SQRT(32.2*P(2,ISLICE,1)*(P(2,ISLICE,1)-PG(1))/(R*T(2,ISLICE,5)))	NFLOEST 0462
IF(WCR.LT.WJ(ISLICE,1)) WCHK(1) = CHKD	NFLOEST 0463
IF(WCR.LT.WJ(ISLICE,1)) WJ(ISLICE,1)=WCR	NFLOEST 0464
C	NFLOEST 0465
120 PAVG = P(2,ISLICE,2)	NFLOEST 0466
WJ(ISLICE,2) = 0.0	NFLOEST 0467
IF (PAVG.GT.PIM) GO TO 130	NFLOEST 0468
WCR=CD*PAVG*AJET(2)/(R*T0G)*SQRT(64.4*GAMO*R*T0G/(GAMO+1.))*	NFLOEST 0469
Z (PIM/PAVG)**((GAMO-1.0)/GAMO)	NFLOEST 0470
WJ(ISLICE,2)=PAVG/(R*T0G)*AJET(2)*CD*	NFLOEST 0471
Z SQRT(64.4*GAMO*R*T0G/(GAMO-1.))* (1.-(PAVG/PIM)**((GAMO-1.)/GAMO))	NFLOEST 0472
Z *(PIM/PAVG)**((GAMO-1.0)/GAMO)	NFLOEST 0473
WFC(2) = 0.0	NFLOEST 0474
IF (P(2,ISLICE,2).GT.PG(2)) WFC(2) = CD*.25*3.1415926*(DHF(2)**2)	NFLOEST 0475
Z *SQRT(32.2*P(2,ISLICE,2)*(P(2,ISLICE,2)-PG(2)) /	NFLOEST 0476
Z (R*T(2,ISLICE,10)))	NFLOEST 0477
IF(WCR.LT.WJ(ISLICE,2)) WCHK(2) = CHKD	NFLOEST 0478
IF(WCR.LT.WJ(ISLICE,2)) WJ(ISLICE,2)=WCR	NFLOEST 0479
C	NFLOEST 0480

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130  PAVG = P(2,ISLICE,3)                                NFLOEST 0481
      WJ(ISLICE,3) = 0.0                                  NFLOEST 0482
      IF (PAVG.GT.PIM) GO TO 140                          NFLOEST 0483
      WCR=CD*PAVG*AJET(3)/(R*TOG)*SQRT(64.4*GAMO*R*TOG/(GAMO+1.))* NFLOEST 0484
      Z (PIM/PAVG)**((GAMO-1.0)/GAMO)                    NFLOEST 0485
      WJ(ISLICE,3)=PAVG/(R*TOG)*AJET(3)*CD*              NFLOEST 0486
      Z SQRT(64.4*GAMO*R*TOG/(GAMO-1.))* (1.-(PAVG/PIM)**((GAMO-1.)/GAMO)) NFLOEST 0487
      Z *(PIM/PAVG)**((GAMO-1.0)/GAMO)                   NFLOEST 0488
      WFC(3) = 0.0                                        NFLOEST 0489
      IF (P(2,ISLICE,3).GT.PG(3)) WFC(3) = CD*.25*3.1415926*(DHF(3)**2) NFLOEST 0490
      Z *SQRT(32.2*P(2,ISLICE,3)*(P(2,ISLICE,3)-PG(3)))/ NFLOEST 0491
      Z (R*T(2,ISLICE,15)))                             NFLOEST 0492
      IF(WCR.LT.WJ(ISLICE,3)) WCHK(3) = CHKD             NFLOEST 0493
      IF(WCR.LT.WJ(ISLICE,3)) WJ(ISLICE,3)=WCR           NFLOEST 0494
140  CONTINUE                                             NFLOEST 0495
C                                           NFLOEST 0496
      DO 150 I = 4,NFWD                                  NFLOEST 0497
      PAVG = P(2,ISLICE,I)                                NFLOEST 0498
      WJ(ISLICE,I) = 0.0                                  NFLOEST 0499
      IF (PAVG.GT.PIM) GO TO 150                          NFLOEST 0500
      WCR=CD*PAVG*AJET(I)/(R*TOG)*SQRT(64.4*GAMO*R*TOG/(GAMO+1.))* NFLOEST 0501
      Z (PIM/PAVG)**((GAMO-1.0)/GAMO)                    NFLOEST 0502
      WJ(ISLICE,I)=PAVG/(R*TOG)*AJET(I)*CD*              NFLOEST 0503
      Z SQRT(64.4*GAMO*R*TOG/(GAMO-1.))* (1.-(PAVG/PIM)**((GAMO-1.)/GAMO)) NFLOEST 0504
      Z *(PIM/PAVG)**((GAMO-1.0)/GAMO)                   NFLOEST 0505
      WFC(I) = 0.0                                        NFLOEST 0506
      IF (P(2,ISLICE,I).GT.PG(I)) WFC(I) = CD*.25*3.1415926*(DHF(I)**2) NFLOEST 0507
      Z *SQRT(32.2*P(2,ISLICE,I)*(P(2,ISLICE,I)-PG(I)))/ NFLOEST 0508
      Z (R*T(2,ISLICE,5*I)))                             NFLOEST 0509
      IF(WCR.LT.WJ(ISLICE,I)) WCHK(I) = CHKD             NFLOEST 0510
      IF(WCR.LT.WJ(ISLICE,I)) WJ(ISLICE,I)=WCR           NFLOEST 0511
150  CONTINUE                                             NFLOEST 0512
C                                           NFLOEST 0513
C  CALCULATE CROSSFLOW RATE AT EACH STATION              NFLOEST 0514
C                                           NFLOEST 0515
200  WCROS(2,ISLICE,JS) = 0.0                            NFLOEST 0516
      JDIS = JS/2                                          NFLOEST 0517
C**** JDIS IS THE DISPLACEMENT OF THE FLOW SPLIT STATION FROM STATION 1 NFLOEST 0518
      JSENS = JS - 2*JDIS                                 NFLOEST 0519
C***** JSENS = 0, STATION IS ON SUCTION SIDE (EVEN);    NFLOEST 0520
C          = 1, STATION IS ON PRESSURE SIDE (ODD)         NFLOEST 0521
      JP = JS + 2                                          NFLOEST 0522
      JM = JS - 2                                          NFLOEST 0523
      IF (JM.LT.1) JM = 1                                  NFLOEST 0524
      JFIN = JS + 1                                        NFLOEST 0525
      JSTART = JS + 3                                      NFLOEST 0526
      IF (JS.EQ.1) GO TO 220                              NFLOEST 0527
      IF (JSENS.EQ.1) GO TO 230                            NFLOEST 0528
      IF (JSENS.EQ.0) GO TO 270                            NFLOEST 0529
C                                           NFLOEST 0530
220  CONTINUE                                             NFLOEST 0531
C***** WCROS AT A GIVEN STATION IS THE CROSSFLOW AT UPSTREAM STATION NFLOEST 0532
C      PLUS IMPINGEMENT JET                               NFLOEST 0533
C      FLOW FROM UPSTREAM STATION MINUS ANY FILM COOLING NFLOEST 0534
C      FLOW AT THIS STATION.                             NFLOEST 0535
C                                           NFLOEST 0536
C** THIS BLOCK IS EXECUTED IF FLOW SPLIT OCCURS AT STATION 1. ISTART=5NFLOEST 0537
      WCROS(2,ISLICE,2) = DELTAN(ISLICE)*(WJ(ISLICE,1)-WFC(1)) - WFC(2) NFLOEST 0538
      WCROS(2,ISLICE,3) = (1.-DELTAN(ISLICE))*(WJ(ISLICE,1)-WFC(1))-WFC(3) NFLOEST 0539
      GO TO 320                                           NFLOEST 0540

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C		NFLOEST 0541
230	CONTINUE	NFLOEST 0542
C*****	THIS BLOCK IS EXECUTED IF FLOW SPLIT STATION IS ON	NFLOEST 0543
C	THE PRESSURE SIDE. JSENS=1	NFLOEST 0544
	WCROS(2,ISLICE,JP)=(1.-DELTAN(ISLICE))*(WJ(ISLICE,JS)-WFC(JS))	NFLOEST 0545
	Z-WFC(JP)	NFLOEST 0546
	WCROS(2,ISLICE,JM)=DELTAN(ISLICE)*(WJ(ISLICE,JS)-WFC(JS))-WFC(JM)	NFLOEST 0547
	IF (JM.EQ.1) GO TO 250	NFLOEST 0548
	IRNG = JDIS - 1	NFLOEST 0549
	DO 240 I = 1,IRNG	NFLOEST 0550
	IBK = (JM - 2*I)	NFLOEST 0551
	IBKP = IBK + 2	NFLOEST 0552
240	WCROS(2,ISLICE,IBK) = WCROS(2,ISLICE,IBKP) + WJ(ISLICE,IBKP)	NFLOEST 0553
	Z - WFC(IBK)	NFLOEST 0554
250	JNOD = JFIN	NFLOEST 0555
	DO 260 I = 2,JNOD,2	NFLOEST 0556
	IM8 = I-2	NFLOEST 0557
	IF (IM8.EQ.0) IM8 = 1	NFLOEST 0558
260	WCROS(2,ISLICE,I) = WCROS(2,ISLICE,IM8) + WJ(ISLICE,IM8)-WFC(I)	NFLOEST 0559
	GO TO 320	NFLOEST 0560
C		NFLOEST 0561
270	CONTINUE	NFLOEST 0562
C*****	THIS BLOCK IS EXECUTED IF FLOW SPLIT STATION IS ON	NFLOEST 0563
C	SUCTION SIDE. JSENS=0	NFLOEST 0564
	WCROS(2,ISLICE,JP)=DELTAN(ISLICE)*(WJ(ISLICE,JS)-WFC(JS))-WFC(JP)	NFLOEST 0565
	IF (JS.EQ.2) JM = 1	NFLOEST 0566
	WCROS(2,ISLICE,JM)=(1.-DELTAN(ISLICE))*(WJ(ISLICE,JS)-WFC(JS))	NFLOEST 0567
	Z-WFC(JM)	NFLOEST 0568
	IF (JM.EQ.1) GO TO 300	NFLOEST 0569
	IF (JM.EQ.2) GO TO 290	NFLOEST 0570
	JM1 = JM-2	NFLOEST 0571
	DO 280 I = 2,JM1,2	NFLOEST 0572
	IBK = (JM-I)	NFLOEST 0573
	IBKP = IBK + 2	NFLOEST 0574
280	WCROS(2,ISLICE,IBK) = WCROS(2,ISLICE,IBKP) + WJ(ISLICE,IBKP)	NFLOEST 0575
	Z - WFC(IBK)	NFLOEST 0576
290	WCROS(2,ISLICE,1) = WCROS(2,ISLICE,2) + WJ(ISLICE,2) - WFC(1)	NFLOEST 0577
300	CONTINUE	NFLOEST 0578
C-----	NOW UP THE PRESSURE SIDE	NFLOEST 0579
	JNOD = JFIN	NFLOEST 0580
	DO 310 I = 3,JNOD,2	NFLOEST 0581
310	WCROS(2,ISLICE,I) = WCROS(2,ISLICE,I-2) + WJ(ISLICE,I-2)-WFC(I)	NFLOEST 0582
C		NFLOEST 0583
320	CONTINUE	NFLOEST 0584
	ISTART = JSTART	NFLOEST 0585
	DO 330 I = ISTART,NFWD	NFLOEST 0586
	WCROS(2,ISLICE,I) = WCROS(2,ISLICE,I-2) + WJ(ISLICE,I-2) - WFC(I)	NFLOEST 0587
330	CONTINUE	NFLOEST 0588
C		NFLOEST 0589
C	CALCULATE CROSSFLOW RE & MACH NUMBER SQUARED, AND FILM COOLING RE,	NFLOEST 0590
C	FOR THE FORWARD REGION.	NFLOEST 0591
C		NFLOEST 0592
	DO 360 I = 1,NFWD	NFLOEST 0593
	LCOOL = 5*I	NFLOEST 0594
	LIN = LCOOL-1	NFLOEST 0595
	AMIN = A(LCOOL)	NFLOEST 0596
C		NFLOEST 0597
C	EVALUATE COOLANT PROPERTIES AT MEAN TEMPERATURE BETWEEN WALL	NFLOEST 0598
C	AND COOLANT BULK	NFLOEST 0599
C		NFLOEST 0600

TMP = (T(2,ISLICE,LCOOL) + T(2,ISLICE,LIN))/2.	NFLOEST 0601
CALL GASTBL(TMP,C,CP,GAM,PD,R,XMU)	NFLOEST 0602
XMUC(I) = XMU	NFLOEST 0603
CPC(I) = CP	NFLOEST 0604
GAMC(I) = GAM	NFLOEST 0605
C	NFLOEST 0606
RE(I) = 12.*3600.*ABS(WCROS(2,ISLICE,I))*DH(I)/(AMIN*XMU)	NFLOEST 0607
REFC(I) = 12.*3600.*WFC(I)/(S(ISLICE)*XMU)	NFLOEST 0608
IF (IHC(I).EQ.3) AMIN = A(LCOOL)*(SP(I)-DP(I))/SP(I)	NFLOEST 0609
W = WCROS(2,ISLICE,I)	NFLOEST 0610
PBAR = P(2,ISLICE,I)	NFLOEST 0611
TBAR = T(2,ISLICE,LCOOL)	NFLOEST 0612
335 AM2(I) = (W/(PBAR*AMIN))**2*R*TBAR/GAMC(I)/32.2	NFLOEST 0613
IF (AM2(I).LT.1.0) GO TO 340	NFLOEST 0614
AMCHOK = AM2(I)	NFLOEST 0615
ICHOKE = I	NFLOEST 0616
340 IF (IHC(I).NE.3) GO TO 350	NFLOEST 0617
AM2(I) = AM2(I)*((AMIN/A(LCOOL))**2)	NFLOEST 0618
350 CONTINUE	NFLOEST 0619
360 CONTINUE	NFLOEST 0620
C	NFLOEST 0621
C CALCULATE FLOW DUMPED DIRECTLY INTO TRAILING EDGE REGION.	NFLOEST 0622
C	NFLOEST 0623
PAVG = .5*(P(2,ISLICE,NFWD) + P(2,ISLICE,NFWD-1))	NFLOEST 0624
IF (PAVG.GT.PIM) GO TO 370	NFLOEST 0625
WCR=CD*PAVG*ADUMP/(R*TOG)*SQRT(64.4*GAMO*R*TOG/(GAMO+1.))*	NFLOEST 0626
Z (PIM/PAVG)**((GAMO-1.0)/GAMO)	NFLOEST 0627
WDUMP=PAVG/(R*TOG)*ADUMP*CD*	NFLOEST 0628
Z SQRT(64.4*GAMO*R*TOG/(GAMO-1.))* (1.-(PAVG/PIM)**((GAMO-1.)/GAMO))	NFLOEST 0629
Z *(PIM/PAVG)**((GAMO-1.0)/GAMO)	NFLOEST 0630
IF(WCR.LT.WDUMP) WCHKDM = CHKD	NFLOEST 0631
IF(WCR.LT.WDUMP) WDUMP=WCR	NFLOEST 0632
C	NFLOEST 0633
C ADD UP TOTAL FLOW FROM IMPINGEMENT PLENUM, WIM.	NFLOEST 0634
C	NFLOEST 0635
370 WIM = WDUMP	NFLOEST 0636
DO 380 I = 1,NSTA	NFLOEST 0637
380 WIM = WIM + WJ(ISLICE,I)	NFLOEST 0638
C	NFLOEST 0639
C TRAILING EDGE REGION, CALCULATE FILM COOLING FLOWS.	NFLOEST 0640
C	NFLOEST 0641
ISTR = NFWD+1	NFLOEST 0642
DO 400 I = ISTR,N,2	NFLOEST 0643
LCOOL = 5*I	NFLOEST 0644
WFC DUM = 0.0	NFLOEST 0645
390 IF (P(2,ISLICE,I).GT.PG(I)) WFC DUM = CD*.25*3.1415926*	NFLOEST 0646
Z SQRT(32.2*P(2,ISLICE,I)*(P(2,ISLICE,I)-PG(I))/	NFLOEST 0647
Z (R*T(2,ISLICE,LCOOL)))	NFLOEST 0648
WFC(I) = WFC DUM*(DHF(I)**2)	NFLOEST 0649
WFC(I+1) = WFC DUM*(DHF(I+1)**2)	NFLOEST 0650
400 CONTINUE	NFLOEST 0651
C	NFLOEST 0652
C TRAILING EDGE REGION, CALCULATE CROSSFLOW, RE, MACH NUMBER	NFLOEST 0653
C SQUARED, AND FILM COOLING RE.	NFLOEST 0654
C	NFLOEST 0655
WCROS(2,ISLICE,ISTR) = WCROS(2,ISLICE,NFWD-1) +	NFLOEST 0656
Z WCROS(2,ISLICE,NFWD) + WDUMP + WJ(ISLICE,NFWD-1)	NFLOEST 0657
Z + WJ(ISLICE,NFWD) - WFC(ISTR) - WFC(ISTR+1)	NFLOEST 0658
WCROS(2,ISLICE,ISTR+1) = WCROS(2,ISLICE,ISTR)	NFLOEST 0659
AMIN = A(NODSF+5)	NFLOEST 0660

C		NFLOEST 0661
C	EVALUATE COOLANT PROPERTIES AT MEAN TEMPERATURE BETWEEN WALL	NFLOEST 0662
C	AND COOLANT BULK	NFLOEST 0663
C		NFLOEST 0664
	TMP = (T(2,ISLICE,5*ISTRT) + T(2,ISLICE,5*ISTRT-1))/2.	NFLOEST 0665
	CALL GASTBL(TMP,C,CP,GAM,PD,R,XMU)	NFLOEST 0666
	XMUC(ISTRT) = XMU	NFLOEST 0667
	XMUC(ISTRT+1) = XMU	NFLOEST 0668
	CPC(ISTRT) = CP	NFLOEST 0669
	CPC(ISTRT+1) = CP	NFLOEST 0670
	GAMC(ISTRT) = GAM	NFLOEST 0671
	GAMC(ISTRT+1) = GAM	NFLOEST 0672
C		NFLOEST 0673
	REFC(ISTRT) = 12.*3600.*WFC(ISTRT)/(S(ISLICE)*XMU)	NFLOEST 0674
	REFC(ISTRT+1) = 12.*3600.*WFC(ISTRT+1)/(S(ISLICE)*XMU)	NFLOEST 0675
	RE(ISTRT) = 12.*3600.*ABS(WCROS(2,ISLICE,ISTRT))*DH(ISTRT)/	NFLOEST 0676
Z	(AMIN*XMU)	NFLOEST 0677
	RE(ISTRT+1) = RE(ISTRT)	NFLOEST 0678
	IS = ISTRT	NFLOEST 0679
	IF (IHC(IS).EQ.3) AMIN = A(NODSF+5)*(SP(IS)-DP(IS))/SP(IS)	NFLOEST 0680
	W = WCROS(2,ISLICE,ISTRT)	NFLOEST 0681
	PBAR = P(2,ISLICE,ISTRT)	NFLOEST 0682
	TBAR = T(2,ISLICE,NODSF+5)	NFLOEST 0683
405	AM2(ISTRT) = (W/(PBAR*AMIN))**2*R*TBAR/GAMC(ISTRT)/32.2	NFLOEST 0684
	IF (AM2(ISTRT).LT.1.0) GO TO 410	NFLOEST 0685
	AMCHOK = AM2(ISTRT)	NFLOEST 0686
	ICHOK = ISTRT	NFLOEST 0687
410	IF (IHC(IS).NE.3) GO TO 420	NFLOEST 0688
	AM2(ISTRT) = AM2(ISTRT)*((AMIN/A(NODSF+5))**2)	NFLOEST 0689
420	AM2(ISTRT+1) = AM2(ISTRT)	NFLOEST 0690
	ISTRT = ISTRT + 2	NFLOEST 0691
	IS = NFW + 1	NFLOEST 0692
	DO 450 I = ISTRT,N,2	NFLOEST 0693
	LCOOL = 5*I	NFLOEST 0694
	AMIN = A(LCOOL)	NFLOEST 0695
	IS = IS + 2	NFLOEST 0696
	IF (IHC(IS).EQ.3) AMIN = A(LCOOL)*(SP(IS)-DP(IS))/SP(IS)	NFLOEST 0697
	WCROS(2,ISLICE,I) = WCROS(2,ISLICE,I-2) - WFC(I) - WFC(I+1)	NFLOEST 0698
	WCROS(2,ISLICE,I+1) = WCROS(2,ISLICE,I)	NFLOEST 0699
C		NFLOEST 0700
C	EVALUATE COOLANT PROPERTIES AT MEAN TEMPERATURE BETWEEN WALL	NFLOEST 0701
C	AND COOLANT BULK	NFLOEST 0702
C		NFLOEST 0703
	TMP = (T(2,ISLICE,LCOOL) + T(2,ISLICE,LCOOL-1))/2.	NFLOEST 0704
	CALL GASTBL(TMP,C,CP,GAM,PD,R,XMU)	NFLOEST 0705
	XMUC(I) = XMU	NFLOEST 0706
	XMUC(I+1) = XMU	NFLOEST 0707
	CPC(I) = CP	NFLOEST 0708
	CPC(I+1) = CP	NFLOEST 0709
	GAMC(I) = GAM	NFLOEST 0710
	GAMC(I+1) = GAM	NFLOEST 0711
C		NFLOEST 0712
	REFC(I) = 12.*3600.*WFC(I)/(S(ISLICE)*XMU)	NFLOEST 0713
	REFC(I+1) = 12.*3600.*WFC(I+1)/(S(ISLICE)*XMU)	NFLOEST 0714
	RE(I) = 12.*3600.*ABS(WCROS(2,ISLICE,I))*DH(I)/(A(LCOOL)*XMU)	NFLOEST 0715
	RE(I+1) = RE(I)	NFLOEST 0716
	W = WCROS(2,ISLICE,I)	NFLOEST 0717
	PBAR = P(2,ISLICE,I)	NFLOEST 0718
	TBAR = T(2,ISLICE,LCOOL)	NFLOEST 0719
425	AM2(I) = (W/(PBAR*AMIN))**2*R*TBAR/GAMC(I)/32.2	NFLOEST 0720

IF (AM2(I).LT.1.0) GO TO 430	NFLOEST 0721
AMCHOK = AM2(I)	NFLOEST 0722
ICHOKE = I	NFLOEST 0723
430 IF (IHC(IS).NE.3) GO TO 440	NFLOEST 0724
AM2(I) = AM2(I)*((AMIN/A(LCOOL))**2)	NFLOEST 0725
440 AM2(I+1) = AM2(I)	NFLOEST 0726
450 CONTINUE	NFLOEST 0727
C	NFLOEST 0728
C CALCULATE COOLANT CHANNEL FRICTION FACTOR AT EACH STATION.	NFLOEST 0729
C	NFLOEST 0730
DO 560 I = 1,NSTA	NFLOEST 0731
LCOOL = 5*I	NFLOEST 0732
IF (WCROS(2,ISLICE,I).LE.0.0) GO TO 550	NFLOEST 0733
C	NFLOEST 0734
C DETERMINE IF RE IS LAMINAR, TRANSITIONAL, OR TURBULENT	NFLOEST 0735
C AND CALCULATE THE FRICTION FACTOR	NFLOEST 0736
C	NFLOEST 0737
IF (IHC(I).EQ.3) GO TO 540	NFLOEST 0738
IF(RE(I).GT.2300.) GO TO 510	NFLOEST 0739
500 FF(I) = DELTA*RE(I)**EPS	NFLOEST 0740
GO TO 560	NFLOEST 0741
510 IF(RE(I).LT.4000.) GO TO 530	NFLOEST 0742
520 FF(I) = ALPHA*RE(I)**BETA	NFLOEST 0743
GO TO 560	NFLOEST 0744
530 A1=DELTA*2300.**EPS	NFLOEST 0745
A2=ALPHA*4000.**BETA	NFLOEST 0746
FF(I) = (A2*(RE(I)-2300.)+A1*(4000.-RE(I)))/1700.	NFLOEST 0747
GO TO 560	NFLOEST 0748
540 CONTINUE	NFLOEST 0749
C	NFLOEST 0750
C FOR A PIN FIN ARRAY:	NFLOEST 0751
FF(I) = 1.060*(RE(I)**(-.3301))	NFLOEST 0752
GO TO 560	NFLOEST 0753
550 CONTINUE	NFLOEST 0754
FF(I) = 0.0	NFLOEST 0755
560 CONTINUE	NFLOEST 0756
C	NFLOEST 0757
C	NFLOEST 0758
C	NFLOEST 0759
C THE FOLLOWING BLOCK IS USED TO COMPUTE THE FILM COOLING EFFECTIVENESS	NFLOEST 0760
C IF IFILM IS SET = 2	NFLOEST 0761
C	NFLOEST 0762
IF (IFILM.LT.2) GO TO 690	NFLOEST 0763
IFSPLT = 0	NFLOEST 0764
DO 610 I = 1,NSTA	NFLOEST 0765
610 XFC(I) = 0.0	NFLOEST 0766
N = NSTA-1	NFLOEST 0767
C LOCATE FILM COOLING HOLES AND SET UP THE XFC ARRAY	NFLOEST 0768
C	NFLOEST 0769
C---IFSPLT IS AN INDICATOR THAT TELLS WHICH SIDE OF THE BLADE STATION 1	NFLOEST 0770
C--- IS TO BE CONSIDERED A PART OF FOR FILM COOLING PURPOSES.	NFLOEST 0771
C--- = 0 IS THE DEFAULT, AND INDICATES SUCTION SIDE	NFLOEST 0772
C--- = 1 WILL INDICATE PRESSURE SIDE.	NFLOEST 0773
C FIRST, MARCH DOWN THE PRESSURE SIDE SEARCHING FOR FILM COOLING HOLES	NFLOEST 0774
IF (DHF(1).GT.0.0) NFC = IFSPLT	NFLOEST 0775
IF (NFC.EQ.0) NFC = NSTA + 1	NFLOEST 0776
XDUM = 0.0	NFLOEST 0777
DO 615 I = 3,NSTA,2	NFLOEST 0778
NOS = 5*I - 4	NFLOEST 0779
IF (I.GT.NFC) XFC(I) = XDUM + DLX(NOS)	NFLOEST 0780

	IF (DHF(I).GT.0.0) GO TO 612	NFLOEST 0781
	XDUM = XFC(I)	NFLOEST 0782
	GO TO 615	NFLOEST 0783
612	NFC = I	NFLOEST 0784
	XDUM = 0.0	NFLOEST 0785
615	CONTINUE	NFLOEST 0786
C		NFLOEST 0787
C--	SUCTION SIDE	NFLOEST 0788
C		NFLOEST 0789
	IF (DHF(1).GT.0.0) NFC = 1 - IPSPLT	NFLOEST 0790
	IF (NFC.EQ.0) NFC = NSTA + 1	NFLOEST 0791
	XDUM = 0.0	NFLOEST 0792
	DO 625 I = 2,N,2	NFLOEST 0793
	NOS = 5*I - 4	NFLOEST 0794
	IF (I.GT.NFC) XFC(I) = XDUM + DLX(NOS)	NFLOEST 0795
	IF (DHF(I).GT.0.0) GO TO 622	NFLOEST 0796
	XDUM = XFC(I)	NFLOEST 0797
	GO TO 625	NFLOEST 0798
622	NFC = I	NFLOEST 0799
	XDUM = 0.0	NFLOEST 0800
625	CONTINUE	NFLOEST 0801
C INT.	J. HT. & MASS TRANS., V8, 1965, PP 55-65	NFLOEST 0802
C	FLMEFF = 3.09*((X/(M*S))*(RE*MUC/MUG)**(-1/4) + 4.1)**(-.8)	NFLOEST 0803
C		NFLOEST 0804
	IFCS = 0	NFLOEST 0805
	IFCP = 0	NFLOEST 0806
	IF (WFC(1).LE.0.0) GO TO 630	NFLOEST 0807
	IFCS = 1 - IPSPLT	NFLOEST 0808
	IFCP = IPSPLT	NFLOEST 0809
	IF (RHOVGA(1).GT.0.0) EMES(1) = 144.*WFC(1)/(RHOVGA(1)*S(ISLICE))	NFLOEST 0810
630	CONTINUE	NFLOEST 0811
	DO 650 I=2,NSTA	NFLOEST 0812
	ISENS = I - 2*(I/2)	NFLOEST 0813
	IF (RHOVGA(I).GT.0.) EMES(I) = 144.*WFC(I)/(RHOVGA(I)*S(ISLICE))	NFLOEST 0814
	FLMEFF(I) = 0.0	NFLOEST 0815
	IF (ISENS.EQ.0) GO TO 640	NFLOEST 0816
C	PRESSURE SIDE SUPPLY HOLE LOCATIONS	NFLOEST 0817
	IF (WFC(I).GT.0.0) IFCP = I	NFLOEST 0818
	NFCSUP(I) = IFCP	NFLOEST 0819
	GO TO 650	NFLOEST 0820
640	CONTINUE	NFLOEST 0821
C	SUCTION SIDE SUPPLY HOLE LOCATIONS	NFLOEST 0822
	IF (WFC(I).GT.0.) IFCS = I	NFLOEST 0823
	NFCSUP(I) = IFCS	NFLOEST 0824
650	CONTINUE	NFLOEST 0825
C		NFLOEST 0826
	TMP = TG(1)	NFLOEST 0827
	CALL GASTBL(TMP,C,CPM,GAM,PD,R,XMUM)	NFLOEST 0828
C		NFLOEST 0829
C	FINALLY, CALCULATE THE EFFECTIVENESS	NFLOEST 0830
C		NFLOEST 0831
	DO 680 I = 1,NSTA	NFLOEST 0832
	IMS = NFCSUP(I)	NFLOEST 0833
	IF (XFC(I).EQ.0.0.OR.EMES(IMS).EQ.0.0.OR.REFC(IMS).EQ.0.0)	NFLOEST 0834
Z	GO TO 680	NFLOEST 0835
	C3 = CPC(IMS)/CPM	NFLOEST 0836
	XBAR = (XFC(I)/EMES(IMS))*((REFC(IMS)*XMUC(I)/XMUM)**(-.25))	NFLOEST 0837
	ETAPRM = 3.09*(XBAR+4.1)**(-.8)	NFLOEST 0838
	FLMEFF(I) = C3*ETAPRM/(1.0 + (C3-1.0)*ETAPRM)	NFLOEST 0839
	IF (FLMEFF(I).GT.1.0) FLMEFF(I) = 1.0	NFLOEST 0840

680	CONTINUE	NFLOEST	0841
C		NFLOEST	0842
C		NFLOEST	0843
690	CONTINUE	NFLOEST	0844
	RETURN	NFLOEST	0845
	END	NFLOEST	0846
C----	SOURCE.NFLSPLP	NFLSPLP	0847
	SUBROUTINE FLSPLT(AJET, EPSN, ISLICE, NODSF, IDELT, JS, DELTAN, ICONV)	NFLSPLP	0848
	DIMENSION DELTAN(15), AJET(80), JSOLDS(25)	NFLSPLP	0849
C		NFLSPLP	0850
C-	SOURCE.NFLSPLP---A SUBROUTINE TO SET THE STATION AT WHICH COOLING	NFLSPLP	0851
C	AIR FLOW SPLITS BETWEEN THE SUCTION	NFLSPLP	0852
C	AND THE PRESSURE SIDE FLOW CHANNELS.	NFLSPLP	0853
C		NFLSPLP	0854
C	INPUT TO FLSPLT IS THE PRESSURE MATCH PARAMETER, EPSN; THE NO. OF	NFLSPLP	0855
C	NODES (NODSF) IN THE IMPINGEMENT REGION;	NFLSPLP	0856
C	JS COMES IN AS THE CURRENT FLOW SPLIT STATION NO., AND IS	NFLSPLP	0857
C	RETURNED AS THE NEW STATION IF A CHANGE IS NEEDED.	NFLSPLP	0858
C	DELTAN COMES IN AS THE CURRENT FRACTION OF FLOW SPLIT TO	NFLSPLP	0859
C	SUCTION SIDE FROM AN IMPINGEMENT	NFLSPLP	0860
C	JET AT JS. IF A CHANGE IN JS IS NOT NEEDED, DELTAN IS	NFLSPLP	0861
C	USED TO FINE TUNE THE SPLIT.	NFLSPLP	0862
C	ICONV INDICATES IF CONVERGENCE IS COMPLETE.	NFLSPLP	0863
C	= 0--NOT DONE; = 1--OK.	NFLSPLP	0864
C		NFLSPLP	0865
	NFWD = NODSF/5	NFLSPLP	0866
	IF (IUNSTB.EQ.1) GO TO 280	NFLSPLP	0867
	IF (IDELT.NE.1) GO TO 220	NFLSPLP	0868
	JNUMS = 0	NFLSPLP	0869
	IUNSTB = 0	NFLSPLP	0870
	NUMS = 0	NFLSPLP	0871
	JSGNCH=0	NFLSPLP	0872
	JOUTRG=0	NFLSPLP	0873
	DO 210 I = 1,25	NFLSPLP	0874
210	JSOLDS(I) = 0	NFLSPLP	0875
220	CONTINUE	NFLSPLP	0876
	CRITR = .002	NFLSPLP	0877
	ICONV = 0	NFLSPLP	0878
	JSENS = JS - 2*(JS/2)	NFLSPLP	0879
C*****	(SUCTION - PRESSURE SIDE PRESSURES)/ SUCTION SIDE = EPSN	NFLSPLP	0880
	IF (ABS(EPSN).LT.CRITR) GO TO 280	NFLSPLP	0881
C		NFLSPLP	0882
C*****	IF EPSN < 0.0; NEED TO INCREASE FLOW TO PRESSURE SIDE	NFLSPLP	0883
C*****	EPSN > 0.0; NEED TO INCREASE FLOW TO SUCTION SIDE	NFLSPLP	0884
C		NFLSPLP	0885
	IF (JTIMES.EQ.0) GO TO 246	NFLSPLP	0886
C		NFLSPLP	0887
C*****	JTIMES = 0, THIS IS FIRST CHECK AT THIS STATION,	NFLSPLP	0888
C	SO ROUGH ADJUST DELTAN;	NFLSPLP	0889
C*****	1, HAVE BEEN HERE BEFORE, SO FINE TUNE DELTAN.	NFLSPLP	0890
C		NFLSPLP	0891
	IF (JSGNCH.GT.0) GO TO 247	NFLSPLP	0892
C		NFLSPLP	0893
C*****	JSGNCH = 0, THERE HAS NOT BEEN A PRIOR SIGN CHANGE IN EPSN;	NFLSPLP	0894
C*****	= 1, THERE HAS BEEN A SIGN CHANGE BEFORE,	NFLSPLP	0895
C	SO STAY AT THIS STATION	NFLSPLP	0896
C		NFLSPLP	0897
C		NFLSPLP	0898
C		NFLSPLP	0899
242	IF (EPSO/EPSN.LT.0.) JSGNCH = 1	NFLSPLP	0900

C		NFLSPLP 0901
247	CONTINUE	NFLSPLP 0902
	IF (EPLAST/EPSN.GE.0) GO TO 243	NFLSPLP 0903
	DELTAO = DELAST	NFLSPLP 0904
	EPSO = EPLAST	NFLSPLP 0905
243	CONTINUE	NFLSPLP 0906
	IF (JSGNCH.EQ.0) GO TO 252	NFLSPLP 0907
	IF (NUMS.GT.0) GO TO 248	NFLSPLP 0908
	EPSMIN = ABS(EPSN)	NFLSPLP 0909
	DLTAOP = DELTAN(ISLICE)	NFLSPLP 0910
248	NUMS = NUMS + 1	NFLSPLP 0911
	IF (ABS(EPSN).GT.EPSMIN) GO TO 249	NFLSPLP 0912
	EPSMIN = ABS(EPSN)	NFLSPLP 0913
	DLTAOP = DELTAN(ISLICE)	NFLSPLP 0914
249	CONTINUE	NFLSPLP 0915
	IF (NUMS.LT.4) GO TO 252	NFLSPLP 0916
	IF (JNUMS.EQ.1) GO TO 250	NFLSPLP 0917
	NUMS = 0	NFLSPLP 0918
	JNUMS = 1	NFLSPLP 0919
	DELTAN(ISLICE) = DELTAO	NFLSPLP 0920
	JTIMES = 0	NFLSPLP 0921
	JSGNCH = 0	NFLSPLP 0922
	JOUTRG = 0	NFLSPLP 0923
	GO TO 290	NFLSPLP 0924
250	CONTINUE	NFLSPLP 0925
	DELAST = DELTAN(ISLICE)	NFLSPLP 0926
	DELTAN(ISLICE) = DLTAOP	NFLSPLP 0927
	IUNSTB = 1	NFLSPLP 0928
	GO TO 290	NFLSPLP 0929
C		NFLSPLP 0930
C		NFLSPLP 0931
246	JTIMES = 1	NFLSPLP 0932
	EPSO = EPSN	NFLSPLP 0933
	DELTAO = DELTAN(ISLICE)	NFLSPLP 0934
	IF (EPSO.GT.0.0) DELTAN(ISLICE) = (1.0+DELTAN(ISLICE))/2.0	NFLSPLP 0935
	IF (EPSO.LT.0.0) DELTAN(ISLICE) = DELTAN(ISLICE)/2.	NFLSPLP 0936
	IF (DELTAN(ISLICE).EQ.DELTAO) DELTAN(ISLICE) = DELTAN(ISLICE) +	NFLSPLP 0937
Z	(.5-DELTAN(ISLICE))/5.	NFLSPLP 0938
	GO TO 290	NFLSPLP 0939
C		NFLSPLP 0940
C		NFLSPLP 0941
252	CONTINUE	NFLSPLP 0942
	TERM = EPSN*(DELTAO-DELTAN(ISLICE))/(EPSO-EPSN)	NFLSPLP 0943
	IF (TERM.EQ.0.) TERM = .05	NFLSPLP 0944
	IF (JSGNCH.GT.0) GO TO 255	NFLSPLP 0945
	DELTAO = DELTAN(ISLICE)	NFLSPLP 0946
	EPSO = EPSN	NFLSPLP 0947
255	CONTINUE	NFLSPLP 0948
	DELAST = DELTAN(ISLICE)	NFLSPLP 0949
	DELTAN(ISLICE) = DELTAN(ISLICE) - TERM	NFLSPLP 0950
	IF (DELTAN(ISLICE).LT.1.0.AND.DELTAN(ISLICE).GT.0.0) GO TO 290	NFLSPLP 0951
	IF (JOUTRG.GT.0) GO TO 258	NFLSPLP 0952
	IF (DELTAN(ISLICE).LT.0.0) DELTAN(ISLICE) = .01	NFLSPLP 0953
	IF (DELTAN(ISLICE).GT.1.0) DELTAN(ISLICE) = .99	NFLSPLP 0954
	JOUTRG = 1	NFLSPLP 0955
	GO TO 290	NFLSPLP 0956
C		NFLSPLP 0957
C		NFLSPLP 0958
258	CONTINUE	NFLSPLP 0959
	JOUTRG = 0	NFLSPLP 0960

C		NFLSPLP 0961
C		NFLSPLP 0962
	JSGNCH = 0	NFLSPLP 0963
	JTIMES = 0	NFLSPLP 0964
	JSOLDS(JS) = 1	NFLSPLP 0965
	IF (DELTAN(ISLICE).LT.1.) GO TO 265	NFLSPLP 0966
C		NFLSPLP 0967
C***	MOVE JS IN PRESSURE DIRECTION	NFLSPLP 0968
	IF (JSSENS.EQ.0) GO TO 262	NFLSPLP 0969
261	JS = JS + 2	NFLSPLP 0970
	IF (AJET(JS).LE.0.) GO TO 261	NFLSPLP 0971
	GO TO 285	NFLSPLP 0972
C		NFLSPLP 0973
C		NFLSPLP 0974
262	CONTINUE	NFLSPLP 0975
	IF (JS.EQ.2) JS = 1	NFLSPLP 0976
	IF (JS.GT.2) JS = JS - 2	NFLSPLP 0977
	IF (AJET(JS).LE.0.) GO TO 262	NFLSPLP 0978
	GO TO 285	NFLSPLP 0979
C		NFLSPLP 0980
C		NFLSPLP 0981
265	CONTINUE	NFLSPLP 0982
C***	MOVE JS IN SUCTION DIRECTION	NFLSPLP 0983
	IF (JSSENS.EQ.0) GO TO 267	NFLSPLP 0984
	IF (JS.EQ.1) JS = 2	NFLSPLP 0985
	IF (JS.GE.3) JS = JS - 2	NFLSPLP 0986
	IF (AJET(JS).GT.0.) GO TO 285	NFLSPLP 0987
	JSSENS = JS - 2*(JS/2)	NFLSPLP 0988
	GO TO 265	NFLSPLP 0989
C		NFLSPLP 0990
C		NFLSPLP 0991
267	CONTINUE	NFLSPLP 0992
	JS = JS + 2	NFLSPLP 0993
	IF (AJET(JS).LE.0.) GO TO 267	NFLSPLP 0994
	GO TO 285	NFLSPLP 0995
C		NFLSPLP 0996
C*****	GET READY TO LEAVE SUBROUTINE	NFLSPLP 0997
C		NFLSPLP 0998
C	THIS BLOCK IS EXECUTED IF CONVERGENCE WAS DETECTED	NFLSPLP 0999
C		NFLSPLP 1000
280	ICONV = 1	NFLSPLP 1001
	JTIMES = 0	NFLSPLP 1002
	IF (IUNSTB.EQ.1) WRITE(6,284) ISLICE,IDELT,JS,DELTAN(ISLICE)	NFLSPLP 1003
	IF (IUNSTB.EQ.1) WRITE(8,284) ISLICE,IDELT,JS,DELTAN(ISLICE)	NFLSPLP 1004
	IUNSTB = 0	NFLSPLP 1005
	EPLAST = EPSN	NFLSPLP 1006
	RETURN	NFLSPLP 1007
284	FORMAT(1H2,40(' '),40('*'))/' SLICE ',I2,', POOR FLOW SPLIT, ',	NFLSPLP 1008
	Z I3,' ITERATIONS, SPLIT AT STATION ',	NFLSPLP 1009
	Z I2,', BEST SPLIT IS AT DELTA = ',F6.4)	NFLSPLP 1010
C		NFLSPLP 1011
C		NFLSPLP 1012
C	THIS BLOCK IS EXECUTED FOR AN ABNORMAL EXIT---PROGRAM IS TERMINATED	NFLSPLP 1013
C		NFLSPLP 1014
789	CONTINUE	NFLSPLP 1015
	WRITE(6,792) DELTAN(ISLICE)	NFLSPLP 1016
	WRITE(8,792) DELTAN(ISLICE)	NFLSPLP 1017
	STOP	NFLSPLP 1018
792	FORMAT(/5X,' ***** FLOW SPLIT CANNOT BE MADE AS SPECIFIED,',	NFLSPLP 1019
	Z ' DELTA = ',F9.5)	NFLSPLP 1020

C		NFLSPLP 1021
C		NFLSPLP 1022
285	IF (JSOLDS(JS).EQ.1) GO TO 789	NFLSPLP 1023
	DELTAN(ISLICE) = .50	NFLSPLP 1024
C		NFLSPLP 1025
C		NFLSPLP 1026
C	THIS BLOCK IS THE USUAL EXIT AFTER ADJUSTING THE FLOW SPLIT	NFLSPLP 1027
C		NFLSPLP 1028
290	CONTINUE	NFLSPLP 1029
	EPLAST = EPSN	NFLSPLP 1030
	IF (JSGNCH.EQ.0) DELAST = DELTAO	NFLSPLP 1031
	IDELT = IDELT + 1	NFLSPLP 1032
	RETURN	NFLSPLP 1033
	END	NFLSPLP 1034
C----	SOURCE.NGASDAT	NGASDAT 1035
	BLOCK DATA	NGASDAT 1036
C		NGASDAT 1037
C--	SOURCE.NGASDAT---	NGASDAT 1038
C		NGASDAT 1039
	COMMON /GAAS/ GS(200),NG	NGASDAT 1040
	DATA GS/620., 1160., 1700., 2240., 2780., 3320.,	NGASDAT 1041
Z	.02564, .03580, .04548, .05467, .06435, .07475,	NGASDAT 1042
Z	.2511, .2681, .2814, .2939, .3070, .3214,	NGASDAT 1043
Z	.706, .706, .705, .703, .702, .699,	NGASDAT 1044
Z	.07233, .09458, .11369, .13063, .14683, .16256,	NGASDAT 1045
Z	170*0.0/, NG /6/	NGASDAT 1046
C		NGASDAT 1047
C----	GS IS TABLE OF AIR PROPERTIES VS TEMPERATURE AT CONSTANT PRESSURE	NGASDAT 1048
C---	PROPERTY VALUES ARE FROM POFERL & SVEHLA, TN D-7488, AT 20 ATM.	NGASDAT 1049
C----	NG IS THE NUMBER OF TEMPERATURE ENTRIES IN THE TABLE	NGASDAT 1050
C---	ENTRIES IN GS ARE:	NGASDAT 1051
C---	1ST NG ARE TEMPERATURE, (F)	NGASDAT 1052
C---	2ND NG ARE THERMAL CONDUCTIVITY, (BTU/(HR*FT*R))	NGASDAT 1053
C---	3RD NG ARE SPECIFIC HEAT, (BTU/(LBM*R))	NGASDAT 1054
C---	4TH NG ARE PRANDTL NUMBER	NGASDAT 1055
C---	5TH NG ARE VISCOSITY, (LBM/(FT*HR))	NGASDAT 1056
C		NGASDAT 1057
	END	NGASDAT 1058
C----	SOURCE.NGASTB	NGASTB 1059
	SUBROUTINE GASTBL(TMP,C,CP,GAM,PD,R,XMU)	NGASTB 1060
C		NGASTB 1061
C-	SOURCE.NGASTB	NGASTB 1062
C		NGASTB 1063
C	A SUBROUTINE TO LOOK UP GAS PROPERTIES IN AN INPUT TABLE (GS(200))	NGASTB 1064
C	WHERE TMP = TEMPERATURE AT WHICH PROPERTIES ARE TO BE EVALUATED (R)	NGASTB 1065
C	C = GAS THERMAL CONDUCTIVITY (BTU/(HR*FT*R))	NGASTB 1066
C	CP = GAS SPECIFIC HEAT (BTU/(LBM*R))	NGASTB 1067
C	GAM = RATIO OF SPECIFIC HEATS	NGASTB 1068
C	PD = PRANDTL NUMBER	NGASTB 1069
C	R = SPECIFIC GAS CONSTANT (FT*LBF)/(LBM*R)	NGASTB 1070
C	XMU = VISCOSITY (LBM/(FT*HR))	NGASTB 1071
C		NGASTB 1072
	COMMON /GAAS/ GS(200),NG	NGASTB 1073
	DIMENSION AC(5)	NGASTB 1074
C		NGASTB 1075
	TMP1=TMP - 460.	NGASTB 1076
	IF(TMP1.GT.GS(1)) GO TO 200	NGASTB 1077
100	AP1=0.0	NGASTB 1078
	AP2=1.0	NGASTB 1079
	I1=2	NGASTB 1080

	I2=1	NGASTB	1081
	GO TO 500	NGASTB	1082
200	DO 300 I=1,NG	NGASTB	1083
	I1=I	NGASTB	1084
	IF(GS(I).GT.TMP1) GO TO 400	NGASTB	1085
300	CONTINUE	NGASTB	1086
	TMP1=GS(NG)	NGASTB	1087
400	I2=I1-1	NGASTB	1088
	AP1=(TMP1-GS(I2))/(GS(I1)-GS(I2))	NGASTB	1089
	AP2=1.0-AP1	NGASTB	1090
500	DO 600 J=1,4	NGASTB	1091
	I1=I1+NG	NGASTB	1092
	I2=I2+NG	NGASTB	1093
600	AC(J)=AP1*GS(I1)+AP2*GS(I2)	NGASTB	1094
	AC(5)=1.0/(1.0-R/(778.2*AC(2)))	NGASTB	1095
	C=AC(1)	NGASTB	1096
	CP=AC(2)	NGASTB	1097
	PD=AC(3)	NGASTB	1098
	XMU=AC(4)	NGASTB	1099
	GAM=AC(5)	NGASTB	1100
	RETURN	NGASTB	1101
	END	NGASTB	1102
	C-----SOURCE.NGAUS	NGAUS	1103
	SUBROUTINE GAUSS(N,K)	NGAUS	1104
	C	NGAUS	1105
	C- SOURCE.NGAUS----	NGAUS	1106
	C	NGAUS	1107
	C-----GIVEN A COMPRESSED VERSION OF AN AUGMENTED, BAND MATRIX A	NGAUS	1108
	C-----WERE K IS THE WIDTH OF THE BAND, N IS THE NUMBER OF ROWS (MAX 400)	NGAUS	1109
	C-----DIAGONAL ELEMENTS OF THE ORIGINAL MATRIX ARE STORED IN	NGAUS	1110
	C-----COLUMN ((K/2)+1) -- TCOF(I,((K/2)+1))	NGAUS	1111
	C-----THE ORIGINAL RIGHT HAND SIDE IS IN COLUMN K+1--- TCOF(I,K+1)	NGAUS	1112
	C-----GAUSS ELIMINATION IS USED TO MAKE ALL ELEMENTS BELOW	NGAUS	1113
	C-----THE DIAGONAL ZERO.	NGAUS	1114
	C-----BACK-SUBSTITUTION IS USED TO COMPUTE THE X'S, WHICH ARE	NGAUS	1115
	C-----RETURNED IN TCOF(I,K+1)	NGAUS	1116
	C	NGAUS	1117
	REAL*8 TCOF	NGAUS	1118
	COMMON /MATRX/ TCOF(400,30)	NGAUS	1119
	IWR = 0	NGAUS	1120
	NROW = 0	NGAUS	1121
	IF (IWR.EQ.0) GO TO 63	NGAUS	1122
	C	NGAUS	1123
	C DEBUGGING OUTPUT:	NGAUS	1124
	C	NGAUS	1125
	C IWR CAN BE SET DYNAMICALLY IN ORDER TO GET DEBUG OUTPUT OF	NGAUS	1126
	C SELECTED ROWS OF THE MATRIX, BEFORE OR AFTER REDUCTION.	NGAUS	1127
	C	NGAUS	1128
	WRITE(8,57)	NGAUS	1129
57	FORMAT(' ENTER NUMBER OF ROW TO BE DISPLAYED. USE I3 FORMAT')	NGAUS	1130
58	READ(7,59) NROW	NGAUS	1131
59	FORMAT(I3)	NGAUS	1132
	IF (NROW.EQ.0) GO TO 63	NGAUS	1133
	KP = K+1	NGAUS	1134
	WRITE(8,60) NROW	NGAUS	1135
	WRITE(8,61) (I,TCOF(NROW,I),I=1,KP)	NGAUS	1136
60	FORMAT(/' TCOF MATRIX, ROW NO. ',I3)	NGAUS	1137
61	FORMAT(5('(',I3,',',',D17.10,',')'))	NGAUS	1138
	WRITE(8,62)	NGAUS	1139
62	FORMAT(/' ENTER ANOTHER ROW NO. OR 000 TO CONTINUE PROCESSING')	NGAUS	1140

GO TO 58	NGAUS	1141
C	NGAUS	1142
C	NGAUS	1143
63 CONTINUE	NGAUS	1144
65 JPIV = K/2 + 1	NGAUS	1145
N1 = N-1	NGAUS	1146
DO 100 I = 1,N1	NGAUS	1147
JS = I+1	NGAUS	1148
JF = I + K/2	NGAUS	1149
IF (JF.GT.N) JF = N	NGAUS	1150
PIVOT = TCOF(I,JPIV)	NGAUS	1151
IF (PIVOT.EQ.0.0) GO TO 130	NGAUS	1152
DO 90 J = JS,JF	NGAUS	1153
JR = JPIV-J+I	NGAUS	1154
IF (DABS(TCOF(J,JR)).LT.1.0D-30) GO TO 90	NGAUS	1155
FM = TCOF(J,JR)/PIVOT	NGAUS	1156
TCOF(J,JR) = 0.0	NGAUS	1157
LS = JR + 1	NGAUS	1158
LF = LS + K/2	NGAUS	1159
IF (LF.LT.LS) GO TO 85	NGAUS	1160
DO 80 L = LS,LF	NGAUS	1161
LR = L+JPIV+1-LS	NGAUS	1162
IF (LR.GT.K) GO TO 85	NGAUS	1163
80 TCOF(J,L) = TCOF(J,L) - FM*TCOF(I,LR)	NGAUS	1164
85 TCOF(J,K+1) = TCOF(J,K+1) - FM*TCOF(I,K+1)	NGAUS	1165
90 CONTINUE	NGAUS	1166
100 CONTINUE	NGAUS	1167
C	NGAUS	1168
C	NGAUS	1169
155 IF (IWR.EQ.0) GO TO 163	NGAUS	1170
C	NGAUS	1171
C DEBUGGING OUTPUT:	NGAUS	1172
C	NGAUS	1173
WRITE(8,57)	NGAUS	1174
158 READ(7,59) NROW	NGAUS	1175
IF (NROW.EQ.0) GO TO 163	NGAUS	1176
KP = K+1	NGAUS	1177
WRITE(8,60) NROW	NGAUS	1178
WRITE(8,61) (I,TCOF(NROW,I),I=1,KP)	NGAUS	1179
WRITE(8,62)	NGAUS	1180
GO TO 158	NGAUS	1181
C	NGAUS	1182
C	NGAUS	1183
163 CONTINUE	NGAUS	1184
TCOF(N,K+1) = TCOF(N,K+1)/TCOF(N,JPIV)	NGAUS	1185
DO 120 I = 1,N1	NGAUS	1186
IIN = N-I	NGAUS	1187
JF = K/2	NGAUS	1188
SUM = TCOF(IIN,K+1)	NGAUS	1189
DO 115 J = 1,JF	NGAUS	1190
JP = J + JPIV	NGAUS	1191
IJ = J+IIN	NGAUS	1192
IF (IJ.GT.N) GO TO 117	NGAUS	1193
115 SUM = SUM - TCOF(IJ,K+1)*TCOF(IIN,JP)	NGAUS	1194
117 CONTINUE	NGAUS	1195
120 TCOF(IIN,K+1) = SUM/TCOF(IIN,JPIV)	NGAUS	1196
125 CONTINUE	NGAUS	1197
RETURN	NGAUS	1198
130 WRITE(7,135) I	NGAUS	1199
135 FORMAT(/' DIAGONAL ELEMENT FOR ROW ',I2,' IS ZERO. NO ',	NGAUS	1200

Z	'FURTHER ATTEMPT TO SOLVE WILL BE MADE.')	NGAUS	1201
	GO TO 125	NGAUS	1202
	END	NGAUS	1203
C----	SOURCE.NGETINT	NGETINT	1204
	SUBROUTINE GETIN	NGETINT	1205
C		NGETINT	1206
C-	SOURCE.NGETINT----	NGETINT	1207
C		NGETINT	1208
	COMMON /BOUND/ BCXS(400), BCXP(400), BCHGS(1000), BCHGP(1000),	NGETINT	1209
Z	BCTGS(1000), BCTGP(1000), BCQGS(1000), BCQGP(1000),	NGETINT	1210
Z	BCPGS(1000), BCPGP(1000), THUBIN(400), THUB(80),	NGETINT	1211
Z	QHUBIN(400), QHUB(80), TTIPIN(400), TTIP(80),	NGETINT	1212
Z	QTIPIN(400), QTIP(80), RHOVG(400), PEX(400),	NGETINT	1213
Z	BCTIME(50), TTIO(50), PTIO(50), WPLEN,	NGETINT	1214
Z	WSVST(50), AKCTBL(20), AKWTBL(20), NBCS, NBCP	NGETINT	1215
C		NGETINT	1216
	COMMON /FLMCO/ RHOVGA(80), PG(80), XFC(80), FLMEFF(80),	NGETINT	1217
Z	XMUC(80), EMES(80), REFC(80), NFCSUP(80)	NGETINT	1218
C		NGETINT	1219
	COMMON /IMPCOR/ CIMP1, CIMP2, CIMP3, CIMP4, CIMP5, CIMP6, CIMP7,	NGETINT	1220
Z	DIMP1, DIMP2, DIMP3, DIMP4, DIMP5, DIMP6	NGETINT	1221
C		NGETINT	1222
	COMMON /RADL/ APLN(15), DPLN(15), RIN(15), ROUT(15),	NGETINT	1223
Z	PIN(15), TIN(15), W(15), WS	NGETINT	1224
C		NGETINT	1225
	COMMON /SPECL/ CHANL(8000), TITLE(30), INDCHN(2000),	NGETINT	1226
Z	IPLT, MD1, MD2, MD3, IADJIN, IWRITE	NGETINT	1227
C		NGETINT	1228
	COMMON /TCO/ ADUMP, BTA, CD, CP,	NGETINT	1229
Z	GAM, PIM, R, SPAN, TOG,	NGETINT	1230
Z	WDUMP, WIM, AKC(15,80), AKW(15,80),	NGETINT	1231
Z	A(400), AJET(80), AM2(80), CNUM(80),	NGETINT	1232
Z	DH(80), DHF(80), DHJ(80),	NGETINT	1233
Z	DLX(400), FF(80), HC(80), HG(80),	NGETINT	1234
Z	P(2,15,80), PEXIT(15), PUMP(80), QG(80),	NGETINT	1235
Z	QSNK(80), RR(80), S(15), T(2,15,400),	NGETINT	1236
Z	TG(80), TAU(400), WFC(80),	NGETINT	1237
Z	WJ(15,80), WCROS(2,15,80), XN(80),	NGETINT	1238
Z	ICOR, IFILM, IHUB, ITIP,	NGETINT	1239
Z	ISBLOK, ISLICE, NBLKSZ, NSLICE,	NGETINT	1240
Z	NFWD, NSTA, IHC(80)	NGETINT	1241
C		NGETINT	1242
	COMMON /TRNSNT/ RHOC, RHOM, SPHTC, SPHTM,	NGETINT	1243
Z	DLTYME, TYME, TEPS, TYMMAX	NGETINT	1244
C		NGETINT	1245
	COMMON /UNITS/ CINCH(2), CHTC(2), CHFLX(2), CPRSR(2), CMSFL(2),	NGETINT	1246
Z	CTMPF(2), CTCON(2), CDEN(2), CSPHT(2), CGASC(2),	NGETINT	1247
Z	CVISC(2), CRHOVG(2), IUNITS	NGETINT	1248
C		NGETINT	1249
	DIMENSION THK(3), TDLX(5), TFLMHL(10)	NGETINT	1250
C		NGETINT	1251
	NAMelist /TITL/ TITLE	NGETINT	1252
C		NGETINT	1253
	NAMelist /CHANLS/ NSLICE, NSTA, INEDIT, IPLT, IWRITE,	NGETINT	1254
Z	MD1, MD2, MD3, IUNITS, IFILM, IADJIN	NGETINT	1255
C		NGETINT	1256
	NAMelist /BC/ NBCS, NBCP, BCXS, BCXP, BCHGS, BCHGP,	NGETINT	1257
Z	BCTGS, BCTGP, BCQGS, BCQGP, BCPGS, BCPGP,	NGETINT	1258
Z	THUBIN, QHUBIN, TTIPIN, QTIPIN, RHOVG,	NGETINT	1259
Z	PEX, BCTIME, TTIO, PTIO, WPLEN,	NGETINT	1260

Z	WSVST,	AKCTBL,	AKWTBL,	RHOC,	RHOM,		NGETINT	1261
Z	SPHTC,	SPHTM,	DLTYME,	TEPS,	TYMMAX		NGETINT	1262
C							NGETINT	1263
	NAMelist /CONTRL/	NFWD,	ICOR,	NGEO			NGETINT	1264
C							NGETINT	1265
	NAMelist /PROPS/	CD,	SPAN,	ADUMP,	DHYD,	APLEN,	RO,	NGETINT
Z		RI,	CIMP1,	CIMP2,	CIMP3,	CIMP4,	CIMP5,	NGETINT
Z		CIMP6,	CIMP7,	DIMP1,	DIMP2,	DIMP3,	DIMP4,	NGETINT
Z		DIMP5,	DIMP6					NGETINT
C							NGETINT	1270
	NAMelist /GEO/	ISTA,	ISTB,	THK,	TDLX,	TDHJ,	TXN,	NGETINT
Z		TDHF,	TRR,	IHCT,	TDP,	TSP,	TFLMHL	NGETINT
C								NGETINT
	DATA TIKLE/'	'/'						NGETINT
C								NGETINT
C	NSLICE =	THE NO. OF SLICES OF THE BLADE THAT ARE BEING CONSIDERED						NGETINT
C	IHUB =	1 INDICATES A SPECIFIED TEMPERATURE DISTRIBUTION IS GIVEN AT						NGETINT
C		THE HUB END (F)						NGETINT
C		= 2 INDICATES AN ADIABATIC SURFACE AT THE HUB END						NGETINT
C		= 3 INDICATES HEAT FLUX IS SPECIFIED AT HUB END						NGETINT
C		(BTU/HR FT**2 R)						NGETINT
C	ITIP =	1 INDICATES A SPECIFIED TEMPERATURE DISTRIBUTION IS GIVEN AT						NGETINT
C		THE TIP END (F)						NGETINT
C		= 2 INDICATES AN ADIABATIC SURFACE AT THE TIP END						NGETINT
C		= 3 INDICATES HEAT FLUX IS SPECIFIED AT TIP END						NGETINT
C		(BTU/HR FT**2 R)						NGETINT
C	IADJIN =	0, MEANS TO HOLD PTIO CONSTANT AND ADJUST WPLEN;						NGETINT
C		> 0, MEANS TO FIX WPLEN AND ADJUST PTIO.						NGETINT
C	ISTA =	FIRST STATION NUMBER FOR THIS DATA SET						NGETINT
C	IF ISTB IS	SPECIFIED, IT IS THE LAST STATION NUMBER FOR THIS DATA SET						NGETINT
C	IF ISTB IS	SPECIFIED, IT MUST BE EQUAL TO ISTA + A MULTIPLE OF 2.						NGETINT
C	THK =	(1)-COATING THICKNESS, (2)-METAL THICKNESS, AND (3)-CHANNEL						NGETINT
C		WIDTH. ALL IN INCHES.						NGETINT
C	TDLX =	DISTANCE FROM UPSTREAM NODE (INCHES)						NGETINT
C	TDHJ =	HYDRAULIC DIAMETER OF IMPINGEMENT JET HOLE (INCHES) - STORED						NGETINT
C		UNDER STATION NUMBER						NGETINT
C	TDHF =	EFFECTIVE DIAMETER OF FILM COOLING HOLE IF PRESENT (INCHES) -						NGETINT
C		STORED UNDER STATION NUMBER						NGETINT
C		= DIAMETER OF ONE HOLE*SQRT(NO. OF HOLES AT THIS STATION IN THIS						NGETINT
C		SLICE)						NGETINT
C	TXN =	SPANWISE SPACING OF IMPINGEMENT JETS (INCHES)						NGETINT
C	TRR =	RADIAL LOCATION OF THIS STATION (INCHES)						NGETINT
C	IHCT	INDICATES THE TYPE OF INSIDE HEAT TRANSFER AT THIS STATION,						NGETINT
C		= 1 FOR IMPINGEMENT WITH CROSSFLOW						NGETINT
C		= 2 FOR FORCED CONVECTION CHANNEL FLOW						NGETINT
C		= 3 FOR PIN FINS						NGETINT
C	TDP =	THE PIN FIN DIAMETER (IN) IF PINS ARE USED;						NGETINT
C	TSP =	THE PIN FIN SPACING (IN), ASSUMING AN EQUILATERAL TRIANGULAR						NGETINT
C		ARRAY OF PINS.						NGETINT
C	AKCTBL=	TABLE OF CLADDING THERMAL CONDUCTIVITY (BTU/HR FT R) VS						NGETINT
C		TEMPERATURE (F)						NGETINT
C	AKWTBL=	TABLE OF WALL METAL THERMAL CONDUCTIVITY (BTU/HR FT R) VS						NGETINT
C		TEMPERATURE (F)						NGETINT
C	RHOVG =	HOT GAS FREE STREAM MASS VELOCITY, DENSITY*VELOCITY, FOR FILM						NGETINT
C		COOLING USE, AT EACH FILM COOLING STATION.						NGETINT
C		INPUT IN (LBM/SEC FT**2), OR (KG/SEC M**2) IF IUNITS=1						NGETINT
C	RHOC =	DENSITY OF OUTER COATING (LBM/FT**3)						NGETINT
C	RHOM =	DENSITY OF WALL METAL (LBM/FT**3)						NGETINT
C	SPHTC =	SPECIFIC HEAT OF COATING (BTU/LBM R)						NGETINT
C	SPHTM =	SPECIFIC HEAT OF WALL METAL						NGETINT

C	DLTIME = TIME STEP SIZE FOR TRANSIENT CALCULATIONS (SEC)	NGETINT	1321
C	TYMMAX = MAX. TIME (SEC) TO WHICH TRANSIENT IS CARRIED.	NGETINT	1322
C	TEPS = FRACTION OF TIME STEP AT WHICH TEMP. IS EVALUATED. (NEW = OLD	NGETINT	1323
C	+ TEPS*(NEW-OLD))	NGETINT	1324
C	WSVST = TABLE OF WHEEL SPEED VS TIME, (RPM VS SEC), ODD SUBSCRIPTS	NGETINT	1325
C	ARE SPEED,EVEN ARE TIME, WSVST(2)=0.0	NGETINT	1326
C		NGETINT	1327
C	CIMP1 TO CIMP5 ARE EXPONENTS TO BE USED IN A GENERAL	NGETINT	1328
C	IMPINGEMENT WITH CROSSFLOW CORRELATION. IF NOT SPECIFIED, THEN	NGETINT	1329
C	BUILT IN KIRCHER-TABAKOFF CORRELATION IS USED.	NGETINT	1330
C	SEE SUBROUTINE HCOOLT FOR DESCRIPTION OF GENERAL CORRELATION.	NGETINT	1331
C		NGETINT	1332
C	INITIALIZE:	NGETINT	1333
C		NGETINT	1334
100	CONTINUE	NGETINT	1335
	IEND = 0	NGETINT	1336
	IADJIN = 0	NGETINT	1337
	IHUB = 2	NGETINT	1338
	ITIP = 2	NGETINT	1339
	CIMP1 = 0.0	NGETINT	1340
	DIMP1 = 0.0	NGETINT	1341
	ADUMP = 0.0	NGETINT	1342
	IFILM = 0	NGETINT	1343
	IUNITS = 2	NGETINT	1344
	ALPHA = .04	NGETINT	1345
	BETA = -.16	NGETINT	1346
	DELTA = 16.	NGETINT	1347
	EPS = -1.	NGETINT	1348
	CD = .8	NGETINT	1349
C		NGETINT	1350
C	GAS CONSTANT FOR AIR, FT LBF/LBM R	NGETINT	1351
	R = 53.35	NGETINT	1352
C		NGETINT	1353
C--	SET VALUES FOR UNITS CORRECTION FACTORS---	NGETINT	1354
C--	...(1) CONVERTS FROM SI TO ENGLISH, ...(2) MAKES NO CONVERSION--	NGETINT	1355
C	ALREADY IN ENGLISH	NGETINT	1356
C		NGETINT	1357
C---	CINCH(1) IS CONVERSION FACTOR FROM (CM) TO (IN)	NGETINT	1358
	CINCH(1) = .39370	NGETINT	1359
	CINCH(2) = 1.0	NGETINT	1360
C---	CHTC(1) IS CONVERSION FACTOR FROM (WATTS/M**2 K) TO (BTU/HR FT**2R)	NGETINT	1361
	CHTC(1) = .17623	NGETINT	1362
	CHTC(2) = 1.0	NGETINT	1363
C---	CHFLX(1) IS CONVERSION FACTOR FROM (WATTS/M**2) TO (BTU/HR FT**2)	NGETINT	1364
	CHFLX(1) = .31721	NGETINT	1365
	CHFLX(2) = 1.0	NGETINT	1366
C---	CPRSR(1) IS CONVERSION FACTOR FROM (KILOPASCALS) TO (PSIA)	NGETINT	1367
	CPRSR(1) = .14503	NGETINT	1368
	CPRSR(2) = 1.0	NGETINT	1369
C---	CMSFL(1) IS CONVERSION FACTOR FROM (KG/HR) TO (LBM/HR)	NGETINT	1370
	CMSFL(1) = 2.67924	NGETINT	1371
	CMSFL(2) = 1.0	NGETINT	1372
C---	CTMPF(1) IS CONVERSION FACTOR FROM (K) TO (R)	NGETINT	1373
	CTMPF(1) = 1.8	NGETINT	1374
	CTMPF(2) = 1.0	NGETINT	1375
C---	CTCON(1) IS CONVERSION FACTOR FROM (WATTS/M K) TO (BTU/HR FT R)	NGETINT	1376
	CTCON(1) = .57817	NGETINT	1377
	CTCON(2) = 1.0	NGETINT	1378
C---	CDEN(1) IS CONVERSION FACTOR FROM (KG/M**3) TO (LBM/FT**3)	NGETINT	1379
	CDEN(1) = .06243	NGETINT	1380

	CDEN(2) = 1.0	NGETINT 1381
C---	CSPHT(1) IS CONVERSION FACTOR FROM (J/KG K) TO (BTU/LBM R)	NGETINT 1382
	CSPHT(1) = .000239	NGETINT 1383
	CSPHT(2) = 1.0	NGETINT 1384
C---	CVISC(1) IS CONVERSION FACTOR FROM (PA SEC) TO (LBM/FT HR)	NGETINT 1385
	CVISC(1) = 2419.096	NGETINT 1386
	CVISC(2) = 1.0	NGETINT 1387
C---	CGASC(1) IS CONVERSION FROM (J/KG K) TO (FT LBF/LBM R)	NGETINT 1388
	CGASC(1) = .18602	NGETINT 1389
	CGASC(2) = 1.0	NGETINT 1390
C---	CRHOVG IS CONVERSION FROM (KG/SEC M**2) TO (LBM/SEC FT**2)	NGETINT 1391
	CRHOVG(1) = .0204823	NGETINT 1392
	CRHOVG(2) = 1.0	NGETINT 1393
C		NGETINT 1394
	DO 105 I = 1,30	NGETINT 1395
105	TITLE(I) = TIKLE	NGETINT 1396
C		NGETINT 1397
	DO 106 I = 1,1000	NGETINT 1398
	BCHGS(I) = 0.0	NGETINT 1399
	BCHGP(I) = 0.0	NGETINT 1400
	BCTGS(I) = 0.0	NGETINT 1401
	BCTGP(I) = 0.0	NGETINT 1402
	BCQGS(I) = 0.0	NGETINT 1403
	BCQGP(I) = 0.0	NGETINT 1404
	BCPGS(I) = 0.0	NGETINT 1405
106	BCPGP(I) = 0.0	NGETINT 1406
	RHOC = 0.0	NGETINT 1407
	RHOM = 0.0	NGETINT 1408
	SPHTC = 0.0	NGETINT 1409
	SPHTM = 0.0	NGETINT 1410
	DO 107 I = 1,400	NGETINT 1411
	THUBIN(I) = 0.0	NGETINT 1412
	QHUBIN(I) = 0.0	NGETINT 1413
	TTIPIN(I) = 0.0	NGETINT 1414
	QTIPIN(I) = 0.0	NGETINT 1415
	RHOVG(I) = 0.0	NGETINT 1416
107	PEX(I) = 0.0	NGETINT 1417
	DO 108 I = 1,50	NGETINT 1418
	BCTIME(I) = 0.0	NGETINT 1419
	TTIO(I) = 0.0	NGETINT 1420
	PTIO(I) = 0.0	NGETINT 1421
	WSVST(I) = 0.0	NGETINT 1422
108	RR(I) = 0.0	NGETINT 1423
C		NGETINT 1424
	DO 110 I = 1,6000	NGETINT 1425
110	CHANL(I) = 0.0	NGETINT 1426
C		NGETINT 1427
	DO 112 I = 1,15	NGETINT 1428
	PEXIT(I) = 0.0	NGETINT 1429
	DO 112 J = 1,80	NGETINT 1430
	AKC(I,J) = 0.0	NGETINT 1431
112	AKW(I,J) = 0.0	NGETINT 1432
C		NGETINT 1433
	DO 115 I = 1,2000	NGETINT 1434
115	INDCHN(I) = 0	NGETINT 1435
	DO 116 I = 1,20	NGETINT 1436
	AKCTBL(I) = 0.0	NGETINT 1437
116	AKWTBL(I) = 0.0	NGETINT 1438
	IPLOT = 0	NGETINT 1439
	IWRITE = 0	NGETINT 1440

INEDIT = 0	NGETINT 1441
TEPS = 1.0	NGETINT 1442
DLTYME = 0.0	NGETINT 1443
READ(5,TITL)	NGETINT 1444
READ(5,CHANLS)	NGETINT 1445
READ(5,BC)	NGETINT 1446
IF (BCHGS(1).EQ.0.0) BTA=1.0	NGETINT 1447
IF (BCQGS(1) .EQ.0.0) BTA = 0.0	NGETINT 1448
IF (TTIPIN(1).GT.0.0) ITIP = 1	NGETINT 1449
IF (THUBIN(1).GT.0.0) IHUB = 1	NGETINT 1450
IF (ABS(QTIPIN(1)).GT.0.0) ITIP = 3	NGETINT 1451
IF (ABS(QHUBIN(1)).GT.0.0) IHUB = 3	NGETINT 1452
WS = WSVST(1)	NGETINT 1453
C	NGETINT 1454
PEXIT(1) = PEX(1)	NGETINT 1455
DO 175 ICHLNO = 1,NSLICE	NGETINT 1456
C	NGETINT 1457
C ICHLNO IS THE CHANNEL NUMBER; = 1 AT THE HUB, = NSLICE AT THE TIP	NGETINT 1458
C	NGETINT 1459
READ(5,CONTRL)	NGETINT 1460
NODSF = 5*NFW	NGETINT 1461
C--NODSF IS THE NUMBER OF NODES IN THE FORWARD REGION	NGETINT 1462
C	NGETINT 1463
NODST = 5*NSTA	NGETINT 1464
C--NODST IS THE TOTAL NUMBER OF NODES IN THE BLADE SLICE ICHLNO	NGETINT 1465
C	NGETINT 1466
NBLKSZ = (15 + 2*NODST) + 8*NSTA	NGETINT 1467
C--NBLKSZ IS THE SIZE OF THE DATA BLOCK RESERVED IN CHANL ARRAY FOR THIS	NGETINT 1468
C SLICE ICHLNO	NGETINT 1469
C	NGETINT 1470
ISBLOK = IEND + 1	NGETINT 1471
C--ISBLOK IS THE STARTING POINT IN CHANL ARRAY FOR THIS BLOCK OF DATA	NGETINT 1472
C	NGETINT 1473
INSTRT = 15 + (ICHLNO-1)*(15 + NSTA)	NGETINT 1474
C--INSTRT IS THE STARTING POINT IN INDCHN ARRAY FOR THIS BLOCK OF	NGETINT 1475
C INTEGER DATA	NGETINT 1476
C	NGETINT 1477
INDCHN(ICHLNO) = INSTRT	NGETINT 1478
INDCHN(INSTRT) = ICHLNO	NGETINT 1479
INDCHN(INSTRT+1) = IFILM	NGETINT 1480
INDCHN(INSTRT+2) = ICOR	NGETINT 1481
INDCHN(INSTRT+3) = NFW	NGETINT 1482
INDCHN(INSTRT+4) = NSTA	NGETINT 1483
INDCHN(INSTRT+5) = ISBLOK	NGETINT 1484
INDCHN(INSTRT+6) = NBLKSZ	NGETINT 1485
INDCHN(INSTRT+7) = IPLOT	NGETINT 1486
INDCHN(INSTRT+8) = MD1	NGETINT 1487
INDCHN(INSTRT+9) = MD2	NGETINT 1488
INDCHN(INSTRT+10) = MD3	NGETINT 1489
INDCHN(INSTRT+12) = IHUB	NGETINT 1490
INDCHN(INSTRT+13) = ITIP	NGETINT 1491
IIHCTZ = INSTRT + 14	NGETINT 1492
C--IIHCTZ IS THE RELATIVE ZERO POINT IN INDCHN FOR STORAGE OF THE	NGETINT 1493
C INDICATOR IHC	NGETINT 1494
READ(5,PROPS)	NGETINT 1495
S(ICHLNO) = SPAN*CINCH(IUNITS)	NGETINT 1496
APLN(ICHLNO) = APLEN*CINCH(IUNITS)*CINCH(IUNITS)	NGETINT 1497
DPLN(ICHLNO) = DHYD*CINCH(IUNITS)	NGETINT 1498
ROUT(ICHLNO) = RO*CINCH(IUNITS)	NGETINT 1499
RIN(ICHLNO) = RI*CINCH(IUNITS)	NGETINT 1500

C		NGETINT 1501
C	NOW, /GEO/ IS READ, NGEOTIMES, AND THE DATA STORED IN CHANL ARRAY.	NGETINT 1502
C		NGETINT 1503
C		NGETINT 1504
C	ISBLOK = THE STARTING POINT IN CHANL ARRAY FOR CHANNEL ICHLNO DATA	NGETINT 1505
C		NGETINT 1506
C	FIRST, STORE THE SINGLE VALUED DATA	NGETINT 1507
C		NGETINT 1508
	CHANL (ISBLOK) = CD	NGETINT 1509
	CHANL (ISBLOK+1) = ALPHA	NGETINT 1510
	CHANL (ISBLOK+2) = BETA	NGETINT 1511
	CHANL (ISBLOK+3) = DELTA	NGETINT 1512
	CHANL (ISBLOK+4) = EPS	NGETINT 1513
	CHANL (ISBLOK+6) = ADUMP*CINCH(IUNITS)**2	NGETINT 1514
	CHANL (ISBLOK+7) = SPAN*CINCH(IUNITS)	NGETINT 1515
	CHANL (ISBLOK+8) = BTA	NGETINT 1516
	CHANL (ISBLOK+9) = DLTYME	NGETINT 1517
	CHANL (ISBLOK+10) = TEPS	NGETINT 1518
C		NGETINT 1519
C	THEN THE ARRAYS ARE STORED:	NGETINT 1520
C		NGETINT 1521
C	THE FOLLOWING ARE STORED BY NODE NUMBER:	NGETINT 1522
C	THK (TAU), TDLX (DLX)	NGETINT 1523
C	THE REST ARE STORED BY STATION NUMBER:	NGETINT 1524
C	TDHJ (DHJ), TDHF (DHF), TXN (XN), TRR (RR),	NGETINT 1525
C	TDP (DP), TSP (SP),	NGETINT 1526
C	(AKC), (AKW), IHCT (IHC).	NGETINT 1527
C		NGETINT 1528
	ITHKZ = ISBLOK + 14	NGETINT 1529
	ITDLXZ = ISBLOK + 14 + NODST	NGETINT 1530
	ITDHJZ = ISBLOK + 14 + 2*NODST	NGETINT 1531
	ITDHFZ = ISBLOK + 14 + 2*NODST + NSTA	NGETINT 1532
	ITXNZ = ISBLOK + 14 + 2*NODST + 2*NSTA	NGETINT 1533
	ITRRZ = ISBLOK + 14 + 2*NODST + 3*NSTA	NGETINT 1534
	ITDPZ = ISBLOK + 14 + 2*NODST + 4*NSTA	NGETINT 1535
	ITSPZ = ISBLOK + 14 + 2*NODST + 5*NSTA	NGETINT 1536
	IEND = ISBLOK + 14 + 2*NODST + 8*NSTA	NGETINT 1537
	THK (1) = 0.0	NGETINT 1538
	DO 170 I = 1, NGEOT	NGETINT 1539
	ISTB = 0	NGETINT 1540
	READ (5, GEO)	NGETINT 1541
	IF (THK (1).LE.0.0) THK (1) = .0001*THK (2)	NGETINT 1542
	IF (TDLX (1).GT.2.0*TDLX (4).OR.TDLX (4).GT.1.2*TDLX (1))	NGETINT 1543
	Z WRITE (8, 136) ICHLNO, ISTA	NGETINT 1544
136	FORMAT (' CHANNEL ', I2, ', STATION ', I3,	NGETINT 1545
Z	', ---TDLX VALUES DO NOT LOOK RIGHT')	NGETINT 1546
	IF (TDHJ.GT.0..AND.TXN.LT.1.1*TDHJ) WRITE (8, 137) ICHLNO, ISTA	NGETINT 1547
137	FORMAT (' CHANNEL ', I2, ', STATION ', I3,	NGETINT 1548
Z	', ---HOLE SPACING AND DIAMETER DO NOT LOOK RIGHT')	NGETINT 1549
	IF (ISTB.EQ.0) ISTB = ISTA	NGETINT 1550
	DO 165 J = ISTA, ISTB, 2	NGETINT 1551
C		NGETINT 1552
C	J REPRESENTS THE STATION NUMBER IN THIS CASE	NGETINT 1553
C		NGETINT 1554
	JSENS = J - 2*(J/2)	NGETINT 1555
C		NGETINT 1556
C	JSENS = 0 INDICATES THAT STATION NO. IS EVEN AND STATION IS ON	NGETINT 1557
C	SUCTION SIDE	NGETINT 1558
C	JSENS = 1 INDICATES THAT STATION NO. IS ODD AND STATION IS ON	NGETINT 1559
C	PRESSURE SIDE	NGETINT 1560

C	IARG = ITDHJZ + J	NGETINT 1561
	CHANL(IARG) = TDHJ*CINCH(IUNITS)	NGETINT 1562
	IARG = ITDHFZ + J	NGETINT 1563
	CHANL(IARG) = TDHF*CINCH(IUNITS)	NGETINT 1564
	IARG = ITXNZ + J	NGETINT 1565
	CHANL(IARG) = TXN*CINCH(IUNITS)	NGETINT 1566
	IARG = ITRRZ + J	NGETINT 1567
	CHANL(IARG) = TRR*CINCH(IUNITS)	NGETINT 1568
	IARG = ITDPZ + J	NGETINT 1569
	CHANL(IARG) = TDP*CINCH(IUNITS)	NGETINT 1570
	IARG = ITSPZ + J	NGETINT 1571
	CHANL(IARG) = TSP*CINCH(IUNITS)	NGETINT 1572
	IARG = IIHCTZ + J	NGETINT 1573
	INDCHN(IARG) = IHCT	NGETINT 1574
	NODOUT = 5*J - 4	NGETINT 1575
C		NGETINT 1576
C	NODOUT IS THE NODE NO. ON THE OUTSIDE SURFACE AT STATION J	NGETINT 1577
C	5 IS THE NUMBER OF NODES AT STATION J	NGETINT 1578
C		NGETINT 1579
145	CONTINUE	NGETINT 1580
	LOCA = ITDLXZ + NODOUT	NGETINT 1581
	IF (TDLX(3).LE.0.) GO TO 155	NGETINT 1582
	DO 150 L = 1,5	NGETINT 1583
	LOCAL = LOCA + L - 1	NGETINT 1584
150	CHANL(LOCAL) = TDLX(L)*CINCH(IUNITS)	NGETINT 1585
	GO TO 160	NGETINT 1586
155	CHANL(LOCA) = TDLX(1)*CINCH(IUNITS)	NGETINT 1587
	CHANL(LOCA+3) = TDLX(4)*CINCH(IUNITS)	NGETINT 1588
	AA = TDLX(1)	NGETINT 1589
	B = (TDLX(4)-TDLX(1))/(THK(1)+THK(2))	NGETINT 1590
	CHANL(LOCA+1) = (AA + B*THK(1))*CINCH(IUNITS)	NGETINT 1591
	CHANL(LOCA+2) = (AA + B*(THK(1)+THK(2)/2.))*CINCH(IUNITS)	NGETINT 1592
	CHANL(LOCA+4) = (AA + B*(THK(1)+THK(2)+THK(3)/2.))*CINCH(IUNITS)	NGETINT 1593
160	CONTINUE	NGETINT 1594
	LOCA = ITHKZ + NODOUT	NGETINT 1595
	CHANL(LOCA) = THK(1)*CINCH(IUNITS)	NGETINT 1596
	CHANL(LOCA+2) = THK(2)*CINCH(IUNITS)	NGETINT 1597
	CHANL(LOCA+4) = THK(3)*CINCH(IUNITS)	NGETINT 1598
165	CONTINUE	NGETINT 1599
170	CONTINUE	NGETINT 1600
175	CONTINUE	NGETINT 1601
C		NGETINT 1602
C---	CONVERT UNITS ON BC DATA	NGETINT 1603
C		NGETINT 1604
	IF (IUNITS.EQ.2) GO TO 300	NGETINT 1605
	NTBC = 1	NGETINT 1606
	DO 205 I = 2,50	NGETINT 1607
	IF (BCTIME(I).LE.0.0) GO TO 210	NGETINT 1608
205	NTBC = NTBC + 1	NGETINT 1609
210	NSETS = NBCS*NSLICE*NTBC	NGETINT 1610
	NSETP = NBCP*NSLICE*NTBC	NGETINT 1611
C		NGETINT 1612
	DO 215 I = 1,NSETS	NGETINT 1613
	BCXS(I) = BCXS(I)*CINCH(1)	NGETINT 1614
	BCHGS(I) = BCHGS(I)*CHTC(1)	NGETINT 1615
	BCTGS(I) = BCTGS(I)*CTMPF(1) - 460.	NGETINT 1616
	BCQGS(I) = BCQGS(I)*CHFLX(1)	NGETINT 1617
215	BCPGS(I) = BCPGS(I)*CPRSR(1)	NGETINT 1618
C		NGETINT 1619
		NGETINT 1620

DO 220 I = 1,NSETP	NGETINT 1621
BCXP(I) = BCXP(I)*CINCH(1)	NGETINT 1622
BCHGP(I) = BCHGP(I)*CHTC(1)	NGETINT 1623
BCTGP(I) = BCTGP(I)*CTMPF(1) - 460.	NGETINT 1624
BCQGP(I) = BCQGP(I)*CHFLX(1)	NGETINT 1625
220 BCPGP(I) = BCPGP(I)*CPRSR(1)	NGETINT 1626
C	NGETINT 1627
NSET = NSTA*NTBC	NGETINT 1628
DO 225 I = 1,NSET	NGETINT 1629
RHOVG(I) = RHOVG(I)*CRHOVG(1)	NGETINT 1630
THUBIN(I) = THUBIN(I)*CTMPF(1) - 460.	NGETINT 1631
QHUBIN(I) = QHUBIN(I)*CHFLX(1)	NGETINT 1632
TTIPIN(I) = TTIPIN(I)*CTMPF(1) - 460.	NGETINT 1633
225 QTIPIN(I) = QTIPIN(I)*CHFLX(1)	NGETINT 1634
C	NGETINT 1635
NSET = NSLICE*NTBC	NGETINT 1636
DO 230 I = 1,NSET	NGETINT 1637
230 PEX(I) = PEX(I)*CPRSR(IUNITS)	NGETINT 1638
C	NGETINT 1639
DO 235 I = 1,49,2	NGETINT 1640
TTIO(I) = TTIO(I)*CTMPF(IUNITS) - 460.	NGETINT 1641
235 PTIO(I) = PTIO(I)*CPRSR(IUNITS)	NGETINT 1642
WPLEN = WPLEN*CMSFL(IUNITS)	NGETINT 1643
RHOC = RHOC*CDEN(IUNITS)	NGETINT 1644
RHOM = RHOM*CDEN(IUNITS)	NGETINT 1645
SPHTC = SPHTC*CSPHT(IUNITS)	NGETINT 1646
SPHTM = SPHTM*CSPHT(IUNITS)	NGETINT 1647
C	NGETINT 1648
DO 280 I = 1,19,2	NGETINT 1649
AKCTBL(I) = AKCTBL(I)*CTMPF(IUNITS) - 460.	NGETINT 1650
AKCTBL(I+1) = AKCTBL(I+1)*CTCON(IUNITS)	NGETINT 1651
AKWTBL(I) = AKWTBL(I)*CTMPF(IUNITS) - 460.	NGETINT 1652
280 AKWTBL(I+1) = AKWTBL(I+1)*CTCON(IUNITS)	NGETINT 1653
C	NGETINT 1654
300 CONTINUE	NGETINT 1655
C	NGETINT 1656
C	NGETINT 1657
IF (IFILM.NE.2) GO TO 320	NGETINT 1658
DO 310 I = 1,NSTA	NGETINT 1659
310 RHOVGA(I) = RHOVG(I)	NGETINT 1660
C	NGETINT 1661
320 CONTINUE	NGETINT 1662
C	NGETINT 1663
C IF INEDIT .GT. 0, PRINT AN INPUT EDIT	NGETINT 1664
C	NGETINT 1665
DO 180 I = 1,NSLICE	NGETINT 1666
180 CALL INPRT(I,INEDIT)	NGETINT 1667
185 CONTINUE	NGETINT 1668
RETURN	NGETINT 1669
END	NGETINT 1670
C----	
SOURCE.NHCFRCT	NHCFRCT 1671
FUNCTION HCFRCD(IS,LCOOL,LIN)	NHCFRCT 1672
C	NHCFRCT 1673
C- SOURCE.NHCFRCT----	NHCFRCT 1674
C	NHCFRCT 1675
COMMON /TCO/ ADUMP, BTA, CD, CP,	NHCFRCT 1676
Z GAM, PIM, R, SPAN, TOG,	NHCFRCT 1677
Z WDUMP, WIM, AKC(15,80), AKW(15,80),	NHCFRCT 1678
Z A(400), AJET(80), AM2(80), CNUM(80),	NHCFRCT 1679
Z DH(80), DHF(80), DHJ(80),	NHCFRCT 1680


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Z          DLX(400),  FF(80),    HC(80),    HG(80),    NHCFRCT 1681
Z          P(2,15,80),PEXIT(15), PUMP(80),   QG(80),    NHCFRCT 1682
Z          QSNK(80),  RR(80),    S(15),     T(2,15,400), NHCFRCT 1683
Z          TG(80),   TAU(400),  WFC(80),    NHCFRCT 1684
Z          WJ(15,80), WCROS(2,15,80), XN(80),   NHCFRCT 1685
Z          ICOR,     IFILM,     IHUB,       ITIP,     NHCFRCT 1686
Z          ISBLOK,   ISLICE,    NBLKSZ,     NSLICE,    NHCFRCT 1687
Z          NFWD,     NSTA,      IHC(80)     NHCFRCT 1688
C          NHCFRCT 1689
C  COMPUTE TURBULENT HEAT TRANSFER COEFFICIENT IN CHANNEL FLOW: NHCFRCT 1690
C  NU = .023*( RE**.8 )*( PD**.333 ) NHCFRCT 1691
C  NHCFRCT 1692
100  CONTINUE NHCFRCT 1693
      TMP = (T(2,ISLICE,LCOOL) + T(2,ISLICE,LIN))/2. NHCFRCT 1694
      CALL GASTBL(TMP,C,CP,GAM,PD,R,XMU) NHCFRCT 1695
      RE = 12.*3600.*ABS(WCROS(2,ISLICE,IS))*DH(IS)/(A(LCOOL)*XMU) NHCFRCT 1696
      HCFRCD = .023*12.*(C/DH(IS))*(RE**.8)*(PD**.333) NHCFRCT 1697
200  CONTINUE NHCFRCT 1698
      RETURN NHCFRCT 1699
      END NHCFRCT 1700

C-----SOURCE.NHCOOLT NHC00LT 1701
      SUBROUTINE HCOOL(JS) NHC00LT 1702
C NHC00LT 1703
C- SOURCE.NHCOOLT----- NHC00LT 1704
C NHC00LT 1705
C NHC00LT 1706
      COMMON /IMPCOR/ CIMP1, CIMP2, CIMP3, CIMP4, CIMP5, CIMP6, CIMP7, NHC00LT 1707
Z          DIMP1, DIMP2, DIMP3, DIMP4, DIMP5, DIMP6 NHC00LT 1708
C NHC00LT 1709
      COMMON /PRPS/ CPO, GAMO, DP(80), SP(80), RE(80), NHC00LT 1710
Z          CPC(80), GAMC(80), DUMR1(80), DUMR2(80) NHC00LT 1711
C NHC00LT 1712
      COMMON /TCO/ ADUMP, BTA, CD, CP, NHC00LT 1713
Z          GAM, FIM, R, SPAN, TOG, NHC00LT 1714
Z          WDUMP, WIM, AKC(15,80), AKW(15,80), NHC00LT 1715
Z          A(400), AJET(80), AM2(80), CNUM(80), NHC00LT 1716
Z          DH(80), DHF(80), DHJ(80), NHC00LT 1717
Z          DLX(400), FF(80), HC(80), HG(80), NHC00LT 1718
Z          P(2,15,80),PEXIT(15), PUMP(80), QG(80), NHC00LT 1719
Z          QSNK(80), RR(80), S(15), T(2,15,400), NHC00LT 1720
Z          TG(80), TAU(400), WFC(80), NHC00LT 1721
Z          WJ(15,80), WCROS(2,15,80), XN(80), NHC00LT 1722
Z          ICOR, IFILM, IHUB, ITIP, NHC00LT 1723
Z          ISBLOK, ISLICE, NBLKSZ, NSLICE, NHC00LT 1724
Z          NFWD, NSTA, IHC(80) NHC00LT 1725
C NHC00LT 1726
      DIMENSION IGG(80), IRE(80), REJ(80), REJOVR(80) NHC00LT 1727
1  CONTINUE NHC00LT 1728
      TMP=TOG NHC00LT 1729
      CALL GASTBL(TMP,C,CP,GAM,PD,R,XMU) NHC00LT 1730
      CONDUCT = C NHC00LT 1731
      XMUTOG = XMU NHC00LT 1732
      PDTOG = PD NHC00LT 1733
      PI=3.14159 NHC00LT 1734
      IF (JS.GT.1) GO TO 101 NHC00LT 1735
      IF (ICOR.EQ.1) GO TO 101 NHC00LT 1736
      IF (WJ(ISLICE,JS).LE.0.0) GO TO 101 NHC00LT 1737
C NHC00LT 1738
C--- LEADING EDGE HEAT TRANSFER CORRELATION FOR STATIONS FORWARD OF ICORNHC00LT 1739
C--- CORRELATION OF METZGER ET AL, J. ENG. POWER, JULY 1969,PP 149-158 NHC00LT 1740

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C		NHCOOLT 1741
5	NEND=ICOR+1	NHCOOLT 1742
	XS = 0.0	NHCOOLT 1743
	XP = 0.0	NHCOOLT 1744
	DO 50 J = 3,NEND,2	NHCOOLT 1745
	LINS = 5*(J-1) - 1	NHCOOLT 1746
	LINP = 5*J - 1	NHCOOLT 1747
	XS = XS + DLX(LINS)	NHCOOLT 1748
	XP = XP + DLX(LINP)	NHCOOLT 1749
50	CONTINUE	NHCOOLT 1750
55	XL = (XS + XP)/2.	NHCOOLT 1751
	IF (AJET(JS).GT.0.) GMASS = WJ(ISLICE,JS)/AJET(JS)	NHCOOLT 1752
60	BES = PI*DHJ(JS)**2/(4.*XN(JS))	NHCOOLT 1753
	DEH = 2.*BES	NHCOOLT 1754
65	REJ(JS) = 12.*3600.*GMASS*DEH/XMU	NHCOOLT 1755
	PROD = REJ(JS)**.27*(XL/BES)**.52	NHCOOLT 1756
70	STANMX = .355/PROD	NHCOOLT 1757
	HC(JS) = STANMX*CP*GMASS*144.*3600.	NHCOOLT 1758
C		NHCOOLT 1759
	IF (REJ(JS).LT.1150..OR.REJ(JS).GT.6300.) WRITE(6,75) REJ(JS)	NHCOOLT 1760
75	FORMAT(1H /'***WARNING*** LEADING EDGE IMPINGEMENT JET REYNOLDS ',	NHCOOLT 1761
Z	'NUMBER IS ',F8.1/' RANGE OF THE CORRELATION IS 1150',-	NHCOOLT 1762
Z	' < REJ < 6300')	NHCOOLT 1763
	ILEAD = ICOR - 1	NHCOOLT 1764
	IF (ILEAD.LT.2) GO TO 85	NHCOOLT 1765
	DO 80 I = 2,ILEAD	NHCOOLT 1766
	IF(WJ(ISLICE,I).GT.0.0) GO TO 90	NHCOOLT 1767
80	HC(I) = HC(JS)	NHCOOLT 1768
85	CONTINUE	NHCOOLT 1769
	GO TO 101	NHCOOLT 1770
90	WRITE(8,95) ICOR	NHCOOLT 1771
95	FORMAT(//' SOLUTION TERMINATED***TOO MANY ROWS OF IMPINGEMENT',	NHCOOLT 1772
Z	' HOLES FORWARD OF STATION',I3,'. HOLES ARE ',	NHCOOLT 1773
Z	'ALLOWED ONLY AT STATION 1.')	NHCOOLT 1774
	STOP	NHCOOLT 1775
C		NHCOOLT 1776
	C--KIRCHER-TABAKOFF CORRELATION, IMPINGEMENT WITH CROSS FLOW	NHCOOLT 1777
	C--ICOR = STATION NUMBER APPLICATION OF THIS CORRELATION BEGINS	NHCOOLT 1778
C		NHCOOLT 1779
101	IGGC = 0	NHCOOLT 1780
	IREC = 0	NHCOOLT 1781
	ISTRT=ICOR	NHCOOLT 1782
	IF (JS.GT.1) ISTRT= 1	NHCOOLT 1783
C		NHCOOLT 1784
	IF (CIMP1.NE.0.0) GO TO 400	NHCOOLT 1785
	DO 130 I = ISTRT,NFWD	NHCOOLT 1786
	WC = ABS(WCROS(2,ISLICE,I))	NHCOOLT 1787
	II = 5*I	NHCOOLT 1788
	REJ(I) = 0.0	NHCOOLT 1789
	IF (IHC(I).EQ.1) GO TO 103	NHCOOLT 1790
	LCOOL = 5*I	NHCOOLT 1791
	LIN = LCOOL - 1	NHCOOLT 1792
	HC(I) = HCFRCD(I,LCOOL,LIN)	NHCOOLT 1793
	GO TO 130	NHCOOLT 1794
103	CONTINUE	NHCOOLT 1795
	IF (AJET(I).EQ.0.0) GO TO 128	NHCOOLT 1796
	IF (WJ(ISLICE,I).LE.0.) GO TO 128	NHCOOLT 1797
	TMP=(T(2,ISLICE,LIN)+T0G)/2.	NHCOOLT 1798
	CALL GASTBL (TMP,C,CP,GAM,PD,R,XMU)	NHCOOLT 1799
	CONDUCT = C	NHCOOLT 1800

	XMUTOG = XMU	NHCOOLT 1801
	PDTOG = PD	NHCOOLT 1802
105	REJ(I) = WJ(ISLICE,I) / AJET(I) * DHJ(I) / (XMUTOG / 3600.) * 12.0	NHCOOLT 1803
	GG = (WC / A(II)) / (WJ(ISLICE,I) / AJET(I))	NHCOOLT 1804
	IF (GG.LE.2.0) GO TO 110	NHCOOLT 1805
	IGGC = IGGC + 1	NHCOOLT 1806
	IGG(IGGC) = I	NHCOOLT 1807
110	CONTINUE	NHCOOLT 1808
	IF (REJ(I).GE.300.0.AND.REJ(I).LE.3.E4) GO TO 115	NHCOOLT 1809
	IIRC = IIRC + 1	NHCOOLT 1810
	IRE(IIRC) = I	NHCOOLT 1811
115	CONTINUE	NHCOOLT 1812
	IF (REJ(I).LT.3000.) GO TO 120	NHCOOLT 1813
	AM = -.002517 * (XN(I) / DHJ(I)) ** 2 + .068485 * XN(I) / DHJ(I) + .506994	NHCOOLT 1814
	HC(I) = REJ(I) ** AM	NHCOOLT 1815
	HC(I) = HC(I) * EXP(.02596 * (XN(I) / DHJ(I)) ** 2 - .8259 * XN(I) / DHJ(I) + .3985)	NHCOOLT 1816
	HC(I) = HC(I) / (1. + .4696 * (WC / A(II)) / (WJ(ISLICE,I) / AJET(I)) * TAU(II) / DHJ(I)) ** .965)	NHCOOLT 1817
	Z GO TO 125	NHCOOLT 1818
120	AM = -.001452 * (XN(I) / DHJ(I)) ** 2 + .042838 * (XN(I) / DHJ(I)) + .516548	NHCOOLT 1819
	HC(I) = REJ(I) ** AM	NHCOOLT 1820
	HC(I) = HC(I) * EXP(.0126 * (XN(I) / DHJ(I)) ** 2 - .5106 * XN(I) / DHJ(I) - .2057)	NHCOOLT 1821
	HC(I) = HC(I) / (1. + .4215 * (WC / A(II)) / (WJ(ISLICE,I) / AJET(I)) * TAU(II) / DHJ(I)) ** .58)	NHCOOLT 1822
	Z CONTINUE	NHCOOLT 1823
125	HC(I) = HC(I) * CONDCT / DHJ(I) * 12.0 * PDTOG ** .33 * (TAU(II) / DHJ(I)) ** .091	NHCOOLT 1824
	GO TO 130	NHCOOLT 1825
C		NHCOOLT 1826
128	CONTINUE	NHCOOLT 1827
	IF (I.GT.2) HC(I) = HC(I-2)	NHCOOLT 1828
	IF (I.EQ.2) HC(I) = HC(1)	NHCOOLT 1829
	IF (I.EQ.1) HC(I) = HC(3)	NHCOOLT 1830
130	CONTINUE	NHCOOLT 1831
	IST = NFWD + 1	NHCOOLT 1832
	DO 150 I = IST, NSTA, 2	NHCOOLT 1833
	IF (IHC(I).NE.1) GO TO 155	NHCOOLT 1834
150	HC(I) = HC(I-2)	NHCOOLT 1835
155	ISI = NFWD + 2	NHCOOLT 1836
	DO 160 I = IST, NSTA, 2	NHCOOLT 1837
	IF (IHC(I).NE.1) GO TO 165	NHCOOLT 1838
160	HC(I) = HC(I-2)	NHCOOLT 1839
165	CONTINUE	NHCOOLT 1840
	IF (IGGC.GT.0) WRITE(6,140) (IGG(I), I=1, IGGC)	NHCOOLT 1841
	DO 132 I = 1, IIRC	NHCOOLT 1842
	ISTATN = IRE(I)	NHCOOLT 1843
	REJOVR(I) = REJ(ISTATN)	NHCOOLT 1844
132	CONTINUE	NHCOOLT 1845
	IF (IIRC.GT.0) WRITE(6,145) (IRE(I), REJOVR(I), I=1, IIRC)	NHCOOLT 1846
135	CONTINUE	NHCOOLT 1847
140	FORMAT(1H /' ***** WARNING ***** RATIO OF CROSSFLOW TO ',	NHCOOLT 1848
	Z 'JET-FLOW IS OUT OF THE RANGE OF ',	NHCOOLT 1849
	Z 'THE CORRELATION AT THE FOLLOWING STATIONS: '/23X,20(I4,','))	NHCOOLT 1850
145	FORMAT(1H /' ***** WARNING ***** JET REYNOLD'S NUMBER IS ',	NHCOOLT 1851
	Z 'OUT OF THE RANGE OF THE CORRELATION ',	NHCOOLT 1852
	Z 'AT THE FOLLOWING STATIONS: '/1X,8('**',I2,'--',F8.1,'*'))	NHCOOLT 1853
	DO 301 I = 1, NFWD	NHCOOLT 1854
	DUMK2(I) = REJ(I)	NHCOOLT 1855
301	CONTINUE	NHCOOLT 1856
	RETURN	NHCOOLT 1857
C		NHCOOLT 1858
		NHCOOLT 1859
		NHCOOLT 1860

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C--- GENERAL CORRELATION FOR IMPINGEMENT WITH CROSSFLOW IS EVALUATED HERNHCOOLT 1861
C E NHCOOLT 1862
C--- FORM OF CORRELATION IS: NHCOOLT 1863
C--- ST = CIMP1*(GG**CIMP2)*(GI**CIMP3)*((Z/D)**CIMP4) NHCOOLT 1864
C *((X/D)**CIMP5)*(REJ**CIMP6)*(PDTOG**CIMP7) NHCOOLT 1865
C--- WHERE GG IS THE MASS FLUX RATIO, FREE STREAM TO JET, AND NHCOOLT 1866
C--- GI IS THE MOMENTUM FLUX RATIO. NHCOOLT 1867
C NHCOOLT 1868
400 CONTINUE NHCOOLT 1869
DO 450 I = ISTR,NFWD NHCOOLT 1870
WC = ABS(WCROS(2,ISLICE,I)) NHCOOLT 1871
II = 5*I NHCOOLT 1872
ROINVJ = R*T0G/(144.*P(2,ISLICE,I)) NHCOOLT 1873
ROINVC = R*T(2,ISLICE,II)/(144.*P(2,ISLICE,I)) NHCOOLT 1874
REJ(I) = 0.0 NHCOOLT 1875
IF (IHC(I).EQ.1) GO TO 403 NHCOOLT 1876
LCOOL = 5*I NHCOOLT 1877
LIN = LCOOL - 1 NHCOOLT 1878
HC(I) = HCFRCD(I,LCOOL,LIN) NHCOOLT 1879
GO TO 450 NHCOOLT 1880
403 CONTINUE NHCOOLT 1881
IF (AJET(I).EQ.0.0) GO TO 445 NHCOOLT 1882
IF (WJ(ISLICE,I).LE.0.) GO TO 445 NHCOOLT 1883
TMP=(T(2,ISLICE,LIN)+T0G)/2. NHCOOLT 1884
CALL GASTBL (TMP,C,CP,GAM,PD,R,XMU) NHCOOLT 1885
CONDC = C NHCOOLT 1886
XMUTOG = XMU NHCOOLT 1887
PDTOG = PD NHCOOLT 1888
405 REJ(I)=WJ(ISLICE,I)/AJET(I)*DHJ(I)/(XMUTOG/3600.)*12.0 NHCOOLT 1889
GG=(WC/A(II))/(WJ(ISLICE,I)/AJET(I)) NHCOOLT 1890
GI = ((WC/A(II))*2*ROINVC)/((WJ(ISLICE,I)/AJET(I))*2*ROINVJ) NHCOOLT 1891
ZOVERD = TAU(II)/DHJ(I) NHCOOLT 1892
XOVERD = XN(I)/DHJ(I) NHCOOLT 1893
ST = CIMP1*(GG**CIMP2)*(GI**CIMP3)*(ZOVERD**CIMP4) NHCOOLT 1894
Z * (XOVERD**CIMP5)*(REJ(I)**CIMP6)*(PDTOG**CIMP7) NHCOOLT 1895
HC(I) = 144.*3600.*ST*CP*WJ(ISLICE,I)/AJET(I) NHCOOLT 1896
GO TO 450 NHCOOLT 1897
C NHCOOLT 1898
445 CONTINUE NHCOOLT 1899
IF (I.GT.2) HC(I) = HC(I-2) NHCOOLT 1900
IF (I.EQ.2) HC(I) = HC(1) NHCOOLT 1901
IF (I.EQ.1) HC(I) = HC(3) NHCOOLT 1902
450 CONTINUE NHCOOLT 1903
IST = NFWD+1 NHCOOLT 1904
DO 460 I = IST,NSTA,2 NHCOOLT 1905
IF (IHC(I).NE.1) GO TO 465 NHCOOLT 1906
460 HC(I) = HC(I-2) NHCOOLT 1907
465 IST = NFWD+2 NHCOOLT 1908
DO 470 I = IST,NSTA,2 NHCOOLT 1909
IF (IHC(I).NE.1) GO TO 475 NHCOOLT 1910
470 HC(I) = HC(I-2) NHCOOLT 1911
475 CONTINUE NHCOOLT 1912
C NHCOOLT 1913
DO 485 I = 1,NFWD NHCOOLT 1914
DUMR2(I) = REJ(I) NHCOOLT 1915
485 CONTINUE NHCOOLT 1916
RETURN NHCOOLT 1917
END NHCOOLT 1918

C----SOURCE.NHCPINT NHCPINT 1919
SUBROUTINE HCPINS(IS,DELTAN,LCOOL,LCUP,LIN,LCOOLP,PINS,EFAREA) NHCPINT 1920

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C						NHCPINT	1921
C-	SOURCE.NHCPINT----					NHCPINT	1922
C						NHCPINT	1923
	COMMON /PRPS/ CPO,	GAMO,	DP(80),	SP(80),	RE(80),	NHCPINT	1924
Z	CPC(80),	GAMC(80),	DUMR1(80),	DUMR2(80)		NHCPINT	1925
C						NHCPINT	1926
	COMMON /TCO/ ADUMP,	BTA,	CD,	CP,		NHCPINT	1927
Z	GAM,	PIM,	R,	SPAN,	TOG,	NHCPINT	1928
Z	WDUMP,	WIM,	AKC(15,80),	AKW(15,80),		NHCPINT	1929
Z	A(400),	AJET(80),	AM2(80),	CNUM(80),		NHCPINT	1930
Z	DH(80),	DHF(80),	DHJ(80),			NHCPINT	1931
Z	DLX(400),	FF(80),	HC(80),	HG(80),		NHCPINT	1932
Z	P(2,15,80),	PEXIT(15),	PUMP(80),	QG(80),		NHCPINT	1933
Z	QSNK(80),	BR(80),	S(15),	T(2,15,400),		NHCPINT	1934
Z	TG(80),	TAU(400),	WFC(80),			NHCPINT	1935
Z	WJ(15,80),	WCROS(2,15,80),		XN(80),		NHCPINT	1936
Z	ICOR,	IFILM,	IHUB,	ITIP,		NHCPINT	1937
Z	ISBLOK,	ISLICE,	NBLKSZ,	NSLICE,		NHCPINT	1938
Z	NFWD,	NSTA,	IHC(80)			NHCPINT	1939
C						NHCPINT	1940
	DIMENSION EFAREA(80), DELTAN(15)					NHCPINT	1941
C						NHCPINT	1942
C	COMPUTE THE HEAT TRANSFER COEFFICIENT AND EFFECTIVENESS FOR A					NHCPINT	1943
C	TRIANGULAR ARRAY OF PIN FINS					NHCPINT	1944
C						NHCPINT	1945
C	WHERE DP IS PIN DIAMETER IN INCHES AND SP IS PIN SPACING IN INCHES					NHCPINT	1946
C						NHCPINT	1947
	VDP = DP(IS)					NHCPINT	1948
	VSP = SP(IS)					NHCPINT	1949
100	CONTINUE					NHCPINT	1950
	TMP = (T(2,ISLICE,LCOOL) + T(2,ISLICE,LIN))/2.					NHCPINT	1951
	CALL GASTBL(TMP,C,CP,GAM,PD,R,XMU)					NHCPINT	1952
C--	NO. OF PINS AT THIS STATION IS:					NHCPINT	1953
	PINS = SPAN*DLX(LCOOL)/(.86603*VSP**2)					NHCPINT	1954
C--	AVERAGE LENGTH OF PINS:					NHCPINT	1955
	SLP = (TAU(LCOOL) + TAU(LCUP))/2.					NHCPINT	1956
	IF (IS.GT.NFWD.AND.IS.LE.NFWD+2) SLP = TAU(LCOOL)					NHCPINT	1957
C--	MINIMUM FLOW AREA:					NHCPINT	1958
	AMIN = SLP*SPAN*(VSP-VDP)/VSP					NHCPINT	1959
C--	TOTAL SURFACE AREA:					NHCPINT	1960
	AHTTR = 2.*DLX(LCOOL)*SPAN + 3.14159*PINS*(VDP*SLP-VDP**2/4.)					NHCPINT	1961
C--	CHANNEL HYDRAULIC DIAMETER:					NHCPINT	1962
	DH(IS) = 4.*AMIN*DLX(LCOOL)/AHTTR					NHCPINT	1963
	REDH = 12.*3600.*ABS(WCROS(2,ISLICE,IS))*DH(IS)/(AMIN*XMU)					NHCPINT	1964
	TERM1 = -.89*(VSP/SLP)**.5075					NHCPINT	1965
	TERM2 = -3.094*VDP/VSP					NHCPINT	1966
	TERM3 = 4.143*EXP(TERM1 + TERM2)/(REDH**.2946)					NHCPINT	1967
105	CONTINUE					NHCPINT	1968
	HC(IS) = (12.*C/DH(IS))*(.023 + TERM3)*(REDH**.8)*(PD**.333)					NHCPINT	1969
	EML = SQRT(4.*HC(IS)*SLP**2/(AKW(ISLICE,IS)*VDP))					NHCPINT	1970
	EFTVNS = TANH(EML)/EML					NHCPINT	1971
C--	CHECK LOCATION OF HEAT FLOW SPLIT POINT IF THIS IS A TRAILING					NHCPINT	1972
C	EDGE REGION STATION					NHCPINT	1973
C						NHCPINT	1974
	IF (IS.LE.NFWD) GO TO 160					NHCPINT	1975
	TBAR = (T(2,ISLICE,LCOOLP)-T(2,ISLICE,LCOOL))/					NHCPINT	1976
Z	(T(2,ISLICE,LIN)-T(2,ISLICE,LCOOL))					NHCPINT	1977
	HYCOS = COSH(EML)					NHCPINT	1978
	HYSIN = SINH(EML)					NHCPINT	1979
	IF (HYCOS-TBAR.LT.HYSIN) GO TO 120					NHCPINT	1980

110	WRITE(6,110) LCOOLP,LIN,DELTAN(ISLICE)	NHCPINT 1981
	FORMAT(1H //' **** WARNING **** NODE',I3,	NHCPINT 1982
	Z ' IS RECEIVING HEAT FROM NODE',I3,' THROUGH THE PINS.',	NHCPINT 1983
	Z ' RESULTS ARE INVALID. DELTAN =' ,F7.4)	NHCPINT 1984
	GO TO 140	NHCPINT 1985
120	CONTINUE	NHCPINT 1986
	IF (HYCOS-TBAR.GT.0.) GO TO 130	NHCPINT 1987
	WRITE(6,110) LIN,LCOOLP,DELTAN(ISLICE)	NHCPINT 1988
	GO TO 140	NHCPINT 1989
130	CONTINUE	NHCPINT 1990
	XOVR = (HYCOS-TEAR)/HYSIN	NHCPINT 1991
	XOVR = ALOG((1.+XOVR)/(1.-XOVR))/(2.*EML)	NHCPINT 1992
140	CONTINUE	NHCPINT 1993
160	CONTINUE	NHCPINT 1994
	EFAREA(IS) = DLX(LIN)*SPAN	NHCPINT 1995
	Z - 3.14159*PINS*(VDP**2/4.- EFTVNS*VDP*SLP*XOVR)	NHCPINT 1996
	IF (IS.GT.NFWD) EFAREA(IS+1) = DLX(LCOOLP)*SPAN	NHCPINT 1997
	Z - 3.14159*PINS*(VDP**2/4.- EFTVNS*VDP*SLP*(1.-XOVR))	NHCPINT 1998
	IF (IS.LE.NFWD) EFAREA(IS) = DLX(LIN)*SPAN	NHCPINT 1999
	Z - 3.14159*PINS*(VDP**2/4.- EFTVNS*VDP*SLP)	NHCPINT 2000
170	CONTINUE	NHCPINT 2001
	RETURN	NHCPINT 2002
	END	NHCPINT 2003
C----SOURCE.NINPRTT		NINPRTT 2004
	SUBROUTINE INPRT (ICHNL,INEDIT)	NINPRTT 2005
C		NINPRTT 2006
C-	SOURCE.NINPRTT----	NINPRTT 2007
C		NINPRTT 2009
	COMMON /BOUND/ BCXS(400), BCXP(400), BCHGS(1000), BCHGP(1000),	NINPRTT 2009
Z	BCTGS(1000), BCTGP(1000), BCQGS(1000), BCQGP(1000),	NINPRTT 2010
Z	BCPGS(1000), BCPGP(1000), THUBIN(400), THUB(80),	NINPRTT 2011
Z	QHUBIN(400), QHUB(80), TTIPIN(400), TTIP(80),	NINPRTT 2012
Z	QTIPIN(400), QTIP(80), RHOVG(400), PEX(400),	NINPRTT 2013
Z	BCTIME(50), TTIO(50), PTIO(50), WPLEN,	NINPRTT 2014
Z	WSVST(50), AKCTBL(20), AKWTBL(20), NBCS, NBCP	NINPRTT 2015
C		NINPRTT 2016
	COMMON /GAAS/ GS(200), NG	NINPRTT 2017
C		NINPRTT 2018
	COMMON /PRPS/ CPO, GAMO, DP(80), SP(80), RE(80),	NINPRTT 2019
Z	CPC(80), GAMC(80), DUMR1(80), DUMR2(80)	NINPRTT 2020
C		NINPRTT 2021
	COMMON /RADL/ APLN(15), DPLN(15), RIN(15), ROUT(15),	NINPRTT 2022
Z	PIN(15), TIN(15), W(15), WS	NINPRTT 2023
	COMMON /SPECL/ CHANL(8000), TITLE(30), INDCHN(2000),	NINPRTT 2024
Z	IPLLOT, MD1, MD2, MD3, IADJIN, IWRITE	NINPRTT 2025
C		NINPRTT 2026
	COMMON /TCO/ ADUMP, BTA, CD, CP,	NINPRTT 2027
Z	GAM, PIM, R, SPAN, TOG,	NINPRTT 2028
Z	WDUMP, WIM, AKC(15,80), AKW(15,80),	NINPRTT 2029
Z	A(400), AJET(80), AM2(80), CNUM(80),	NINPRTT 2030
Z	DH(80), DHF(80), DHJ(80),	NINPRTT 2031
Z	DLX(400), FF(80), HC(80), HG(80),	NINPRTT 2032
Z	P(2,15,80), PEXIT(15), PUMP(80), QG(80),	NINPRTT 2033
Z	QSNK(80), RR(80), S(15), T(2,15,400),	NINPRTT 2034
Z	TG(80), TAU(400), WFC(80),	NINPRTT 2035
Z	WJ(15,80), WCROS(2,15,80), XN(80),	NINPRTT 2036
Z	ICOR, IFILM, IHUB, ITIP,	NINPRTT 2037
Z	ISBLOK, ISLICE, NBLKSZ, NSLICE,	NINPRTT 2038
Z	NFWD, NSTA, IHC(80)	NINPRTT 2039
C		NINPRTT 2040

	COMMON /TRNSNT/ RHOC,	RHOM,	SPHTC,	SPHTH,	NINPRTT	2041
	Z DLTME,	TYME,	TEPS,	TYMMAX	NINPRTT	2042
C					NINPRTT	2043
	COMMON /UNITS/ CINCH(2),	CHTC(2),	CHFLX(2),	CPRSR(2),	CMSFL(2),	NINPRTT
	Z CTMPF(2),	CTCON(2),	CDEN(2),	CSPHT(2),	CGASC(2),	NINPRTT
	Z CVISC(2),	CRHOVG(2),	IUNITS			NINPRTT
C						2046
	DIMENSION DUM1(10),DUM2(10),DUM3(10),DUM4(10),DUM5(10),DUM6(10),					NINPRTT
	Z DUM7(10),DUM8(10),DUM9(10),DUM53(10),DUM55(10)					NINPRTT
	DIMENSION DUM10(10),DUM11(10),DUM12(10),DUM13(10),DUM14(10),					NINPRTT
	Z DUM15(10),DUM16(10),DUM25(10),DUM52(10)					NINPRTT
	DIMENSION DUM17(10),DUM18(10),DUM19(10),DUM20(10)					NINPRTT
	DIMENSION NFLUID(200), HCAL(4), UL(2), UA(2)					NINPRTT
	DATA HCAL/'IMPG','CHAN','PINS','					NINPRTT
	DATA UL/' CM ',' IN '/					NINPRTT
	DATA UA/' CM*',' IN*'/					NINPRTT
	CALL PREP(ICHNL,NZON,1)					NINPRTT
C						2057
C	INITIALIZE TEMPERATURE DISTRIBUTION (DEGREES R)					NINPRTT
C						2058
	I = ICHNL					NINPRTT
	NODSF = 5*NFPWD					NINPRTT
	NODSTM = 5*NSTA - 4					NINPRTT
	NODST = 5*NSTA					NINPRTT
	DO 830 I1 = 5,NODSF,5					NINPRTT
	IS = I1/5					NINPRTT
	LO = I1-4					NINPRTT
	LJ = I1-3					NINPRTT
	L = I1-2					NINPRTT
	LI = I1-1					NINPRTT
	T(2,I,LO) = .9*TG(IS)					NINPRTT
	T(2,I,LI) = T(2,I,LO)/1.08					NINPRTT
	T(2,I,LJ) = T(2,I,LO) - (T(2,I,LO)-T(2,I,LI))*TAU(LO)/(TAU(LO) +					NINPRTT
	Z TAU(L))					NINPRTT
	T(2,I,L) = T(2,I,LO) - (T(2,I,LO)-T(2,I,LI))*(TAU(LO)+TAU(L)/2.)/					NINPRTT
	Z (TAU(LO)+TAU(L))					NINPRTT
930	T(2,I,I1) = TTIO(1) + 460.					NINPRTT
	ISTRT = NODSF + 5					NINPRTT
	DO 860 I1 = ISTRT,NODSTM,10					NINPRTT
	T(2,I,I1) = T(2,I,NODSF)					NINPRTT
	T(2,I,I1+5) = T(2,I,I1)					NINPRTT
	DO 860 J = 1,4					NINPRTT
	IPJ = I1 + J					NINPRTT
	IMJ = I1 + J - 5					NINPRTT
	IUPP = NODSF + J - 5					NINPRTT
	T(2,I,IPJ) = T(2,I,IUPP)					NINPRTT
860	T(2,I,IMJ) = T(2,I,IUPP)					NINPRTT
	DO 865 J = 1,NODST					NINPRTT
865	T(1,I,J) = T(2,I,J)					NINPRTT
C						NINPRTT
	IF (ICHNL.GT.1) GO TO 94					NINPRTT
	WRITE(6,408)					NINPRTT
408	FORMAT(1H1,////,20X,'PROPERTY TABLES'///)					NINPRTT
	WRITE(6,410)					NINPRTT
410	FORMAT(1H,'OUTER COATING EFFECTIVE THERMAL CONDUCTIVITY')					NINPRTT
C						NINPRTT
	IF (IUNITS.EQ.1) GO TO 420					NINPRTT
C						NINPRTT
	WRITE(6,412) (AKCTBL(I),I=1,19,2)					NINPRTT
	WRITE(6,414) (AKCTBL(I),I=2,20,2)					NINPRTT

412	FORMAT(/5X,'T, (F)',10X,10(F9.1))	NINPRTT 2101
414	FORMAT(5X,'K, (BTU/HR/FT/R)',10(F9.3))	NINPRTT 2102
	WRITE(6,416)	NINPRTT 2103
416	FORMAT(////' WALL METAL THERMAL CONDUCTIVITY')	NINPRTT 2104
	WRITE(6,412) (AKWTBL(I),I=1,19,2)	NINPRTT 2105
	WRITE(6,414) (AKWTBL(I),I=2,20,2)	NINPRTT 2106
C		NINPRTT 2107
	GO TO 445	NINPRTT 2108
C		NINPRTT 2109
420	CONTINUE	NINPRTT 2110
	DO 418 I = 1,19,2	NINPRTT 2111
	AKCTBL(I) = (AKCTBL(I)+460.)/1.8	NINPRTT 2112
	AKWTBL(I) = (AKWTBL(I)+460.)/1.8	NINPRTT 2113
	AKCTBL(I+1) = AKCTBL(I+1)/CTCON(1)	NINPRTT 2114
418	AKWTBL(I+1) = AKWTBL(I+1)/CTCON(1)	NINPRTT 2115
C		NINPRTT 2116
	WRITE(6,422) (AKCTBL(I),I=1,19,2)	NINPRTT 2117
	WRITE(6,424) (AKCTBL(I),I=2,20,2)	NINPRTT 2118
422	FORMAT(/5X,'T, (K)',4X,10(F9.1))	NINPRTT 2119
424	FORMAT(5X,'K, (W/M/K)',10(F9.3))	NINPRTT 2120
	WRITE(6,416)	NINPRTT 2121
	WRITE(6,422) (AKWTBL(I),I=1,19,2)	NINPRTT 2122
	WRITE(6,424) (AKWTBL(I),I=2,20,2)	NINPRTT 2123
C		NINPRTT 2124
C		NINPRTT 2125
	DO 448 I = 1,19,2	NINPRTT 2126
	AKCTBL(I) = 1.8*AKCTBL(I) - 460.	NINPRTT 2127
	AKWTBL(I) = 1.8*AKWTBL(I) - 460.	NINPRTT 2128
	AKCTBL(I+1) = AKCTBL(I+1)*CTCON(1)	NINPRTT 2129
448	AKWTBL(I+1) = AKWTBL(I+1)*CTCON(1)	NINPRTT 2130
C		NINPRTT 2131
445	CONTINUE	NINPRTT 2132
C		NINPRTT 2133
	WRITE(6,450)	NINPRTT 2134
450	FORMAT(1H ////' TABLE OF GAS PROPERTIES')	NINPRTT 2135
	NGS = NG	NINPRTT 2136
	IF (NG.GT.10) NGS = 10	NINPRTT 2137
C		NINPRTT 2138
	IF (IUNITS.EQ.1) GO TO 470	NINPRTT 2139
C		NINPRTT 2140
	WRITE(6,452) (GS(J),J=1,NGS)	NINPRTT 2141
452	FORMAT(/5X,'TEMPERATURE (F)',10(F9.1))	NINPRTT 2142
	L = NG + 1	NINPRTT 2143
	LE = NG + NGS	NINPRTT 2144
	WRITE(6,454) (GS(J),J=L,LE)	NINPRTT 2145
454	FORMAT(5X,'K, (BTU/HR/FT/R)',10(F9.5))	NINPRTT 2146
	L = 2*NG + 1	NINPRTT 2147
	LE = 2*NG + NGS	NINPRTT 2148
	WRITE(6,456) (GS(J),J=L,LE)	NINPRTT 2149
456	FORMAT(5X,'CP, (BTU/LBM/R)',10(F9.5))	NINPRTT 2150
	L = 3*NG + 1	NINPRTT 2151
	LE = 3*NG + NGS	NINPRTT 2152
	WRITE(6,458) (GS(J),J=L,LE)	NINPRTT 2153
458	FORMAT(5X,'PRANDTL NUMBER',10(F9.5))	NINPRTT 2154
	L = 4*NG + 1	NINPRTT 2155
	LE = 4*NG + NGS	NINPRTT 2156
	WRITE(6,460) (GS(J),J=L,LE)	NINPRTT 2157
460	FORMAT(5X,'VIS. (LBM/FT/HR)' 10(F9.5))	NINPRTT 2158
C		NINPRTT 2159
	GO TO 90	NINPRTT 2160

C		NINPRTT	2161
C		NINPRTT	2162
470	CONTINUE	NINPRTT	2163
	DO 471 J = 1,NGS	NINPRTT	2164
471	DUM1(J) = (GS(J)+460.)/1.8	NINPRTT	2165
	WRITE(6,472) (DUM1(J),J=1,NGS)	NINPRTT	2166
472	FORMAT(/5X,'TEMPERATURE (K)',10(F9.1))	NINPRTT	2167
	L = NG + 1	NINPRTT	2168
	LE = NG + NGS	NINPRTT	2169
	JI = 0	NINPRTT	2170
	DO 473 J = L,LE	NINPRTT	2171
	JI = JI+1	NINPRTT	2172
473	DUM1(JI) = GS(J)/CTCON(1)	NINPRTT	2173
	WRITE(6,474) (DUM1(J),J=1,JI)	NINPRTT	2174
474	FORMAT(5X,'K, (W/M/K)',10(F9.5))	NINPRTT	2175
	L = 2*NG + 1	NINPRTT	2176
	LE = 2*NG + NGS	NINPRTT	2177
	JI = 0	NINPRTT	2178
	DO 475 J = L,LE	NINPRTT	2179
	JI = JI+1	NINPRTT	2180
475	DUM1(JI) = GS(J)/CSPHT(1)	NINPRTT	2181
	WRITE(6,476) (DUM1(J),J=1,JI)	NINPRTT	2182
476	FORMAT(5X,'CP, (J/KG/K)',10(F9.2))	NINPRTT	2183
	L = 3*NG + 1	NINPRTT	2184
	LE = 3*NG + NGS	NINPRTT	2185
	WRITE(6,478) (GS(J),J=L,LE)	NINPRTT	2186
478	FORMAT(5X,'PRANDTL NUMBER',10(F9.5))	NINPRTT	2187
	L = 4*NG + 1	NINPRTT	2188
	LE = 4*NG + NGS	NINPRTT	2189
	JI = 0	NINPRTT	2190
	DO 479 J = L,LE	NINPRTT	2191
	JI = JI+1	NINPRTT	2192
479	DUM1(JI) = GS(J)/CVISC(1)	NINPRTT	2193
	WRITE(6,480) (DUM1(J),J=1,JI)	NINPRTT	2194
480	FORMAT(5X,'VIS. (N S/M**2)',10(F9.5))	NINPRTT	2195
C		NINPRTT	2196
90	CONTINUE	NINPRTT	2197
	IF (INEDIT.EQ.0) GO TO 350	NINPRTT	2198
C		NINPRTT	2199
C--	LIST OUT THE INPUT HOT GAS BOUNDARY CONDITIONS--	NINPRTT	2200
C		NINPRTT	2201
C--	MNBC IS THE MAX OF (NBCS & NBCP)	NINPRTT	2202
C		NINPRTT	2203
	MNBC = NBCS	NINPRTT	2204
	IF (MNBC.LT.NBCP) MNBC=NBCP	NINPRTT	2205
	NTIMES = 1	NINPRTT	2206
C--	NTIMES IS THE NUMBER OF TIME STEPS IN BC TABLES	NINPRTT	2207
481	IF (BCTIME(NTIMES+1).LE.0.0) GO TO 482	NINPRTT	2208
	NTIMES = NTIMES + 1	NINPRTT	2209
	GO TO 481	NINPRTT	2210
C		NINPRTT	2211
482	CONTINUE	NINPRTT	2212
	WRITE(6,4820)	NINPRTT	2213
4820	FORMAT(1H1,40X,'HOT GAS BOUNDARY CONDITIONS'/)	NINPRTT	2214
	WRITE(6,483)	NINPRTT	2215
483	FORMAT(' *****SUCTION SIDE*****',22X,	NINPRTT	2216
	Z ' *****PRESSURE SIDE*****')	NINPRTT	2217
C		NINPRTT	2218
C--	SET THE NO. OF POINTS PER TIME STEP IN S&P BC ARRAYS	NINPRTT	2219
	NPRTS = NSLICE*NBCS	NINPRTT	2220

	NPRTT = NSLICE*NBCP	NINPRTT 2221
C	NL = 3	NINPRTT 2222
	DO 499 IT = 1,NTIMES	NINPRTT 2223
C		NINPRTT 2224
C-- SET THE NO. OF POINTS THAT PRECEDED TIME STEP 'IT'		NINPRTT 2225
	NPRCS = NPRTS*(IT-1)	NINPRTT 2226
	NPRCP = NPRTT*(IT-1)	NINPRTT 2227
C		NINPRTT 2228
C--START THE LOOP THROUGH ALL SLICES		NINPRTT 2229
	DO 499 ISL = 1,NSLICE	NINPRTT 2230
C		NINPRTT 2231
C--SET THE NO. OFF POINTS PRECEDING THIS SLICE		NINPRTT 2232
	NBFRS = NPRCS + NBCS*(ISL-1)	NINPRTT 2233
	NBFRP = NPRCP + NBCP*(ISL-1)	NINPRTT 2234
C		NINPRTT 2235
	NL = NL + 3 + MNBC	NINPRTT 2236
	IF (NL.LT.60) GO TO 4860	NINPRTT 2237
	NL = 3 + MNBC	NINPRTT 2238
	WRITE(6,4820)	NINPRTT 2239
	WRITE(6,483)	NINPRTT 2240
4860	CONTINUE	NINPRTT 2241
C		NINPRTT 2242
	IF (IT.EQ.1) WRITE(6,484) ISL	NINPRTT 2243
484	FORMAT(45X,'INITIAL STEADY STATE'/49X,'SLICE NO.',I2)	NINPRTT 2244
	IF (IT.GT.1) WRITE(6,485) BCTIME(IT), ISL	NINPRTT 2245
485	FORMAT(45X,'BCTIME =',F8.3,' SEC'/47X,'SLICE NO.',I2)	NINPRTT 2246
	WRITE(6,486)	NINPRTT 2247
486	FORMAT(4X,'X',7X,'HG',6X,'TG',10X,'QG',6X,'PG',	NINPRTT 2248
Z	26X,'X',7X,'HG',6X,'TG',10X,'QG',6X,'PG')	NINPRTT 2249
C		NINPRTT 2250
C--HERE WE LOOP WITHIN A SLICE		NINPRTT 2251
C		NINPRTT 2252
	DO 499 IBC = 1,MNBC	NINPRTT 2253
	IF (IBC.GT.NBCS) GO TO 487	NINPRTT 2254
	J = NBFRS + IBC	NINPRTT 2255
	JXS = (ISL-1)*NBCS + IBC	NINPRTT 2256
	TBCXS = BCXS(JXS)/CINCH(IUNITS)	NINPRTT 2257
	TBCHGS = BCHGS(J)/CHTC(IUNITS)	NINPRTT 2258
	TBCTGS = BCTGS(J)	NINPRTT 2259
	IF (IUNITS.EQ.1) TBCTGS=(BCTGS(J)+460.)/1.8	NINPRTT 2260
	TBCQGS = BCQGS(J)/CHFLX(IUNITS)	NINPRTT 2261
	TBCPGS = BCPGS(J)/CPRS(IUNITS)	NINPRTT 2262
	WRITE(6,489) TBCXS,TBCHGS,TBCTGS,TBCQGS,TBCPGS	NINPRTT 2263
489	FORMAT(2X,F6.2,2F8.1,F12.1,F8.1)	NINPRTT 2264
487	CONTINUE	NINPRTT 2265
	IF (IBC.GT.NBCP) GO TO 499	NINPRTT 2266
	J = NBFRP + IBC	NINPRTT 2267
	JXP = (ISL-1)*NBCP + IBC	NINPRTT 2268
	TBCXP = BCXP(JXP)/CINCH(IUNITS)	NINPRTT 2269
	TBCHGP = BCHGP(J)/CHTC(IUNITS)	NINPRTT 2270
	TBCTGP = BCTGP(J)	NINPRTT 2271
	IF (IUNITS.EQ.1) TBCTGP=(BCTGP(J)+460.)/1.8	NINPRTT 2272
	TBCQGP = BCQGP(J)/CHFLX(IUNITS)	NINPRTT 2273
	TBCPGP = BCPGP(J)/CPRS(IUNITS)	NINPRTT 2274
	IF (IBC.LE.NBCS) WRITE(6,488) TBCXP,TBCHGP,TBCTGP,TBCQGP,TBCPGP	NINPRTT 2275
	IF (IBC.GT.NBCS) WRITE(6,490) TBCXP,TBCHGP,TBCTGP,TBCQGP,TBCPGP	NINPRTT 2276
488	FORMAT(1H+,65X,F6.2,2F8.1,F12.1,F8.1)	NINPRTT 2277
490	FORMAT(66X,F6.2,2F8.1,F12.1,F8.1)	NINPRTT 2278
499	CONTINUE	NINPRTT 2279
		NINPRTT 2280

94	CONTINUE	NINPRTT 2281
	DO 95 I = 1,200	NINPRTT 2282
95	NFLUID(I) = 0	NINPRTT 2283
100	WRITE(6,150) ICHNL	NINPRTT 2284
	IF (ICHNL.GT.1) GO TO 101	NINPRTT 2285
	IF (IHUB.EQ.1) WRITE(6,142)	NINPRTT 2286
	IF (IHUB.EQ.2) WRITE(6,144)	NINPRTT 2287
	IF (IHUB.EQ.3) WRITE(6,146)	NINPRTT 2288
101	CONTINUE	NINPRTT 2289
	IF (ICHNL.LT.NSLICE) GO TO 102	NINPRTT 2290
	IF (ITIP.EQ.1) WRITE(6,147)	NINPRTT 2291
	IF (ITIP.EQ.2) WRITE(6,148)	NINPRTT 2292
	IF (ITIP.EQ.3) WRITE(6,149)	NINPRTT 2293
102	CONTINUE	NINPRTT 2294
	TRIN = RIN(ICHNL)/CINCH(IUNITS)	NINPRTT 2295
	TROUT = ROUT(ICHNL)/CINCH(IUNITS)	NINPRTT 2296
	TDPLN = DPLN(ICHNL)/CINCH(IUNITS)	NINPRTT 2297
	TAPLN = APLN(ICHNL)/(CINCH(IUNITS)*CINCH(IUNITS))	NINPRTT 2298
	WRITE(6,103) TRIN, UL(IUNITS),TROUT,UL(IUNITS),	NINPRTT 2299
	Z TDPLN,UL(IUNITS),TAPLN,UA(IUNITS)	NINPRTT 2300
103	FORMAT(/' COOLANT PLENUM: RI=',F7.3,A4,' RO=',F7.3,A4,4X,	NINPRTT 2301
	Z 'DHYD=',F7.4,A4,' APLEN=',F7.4,A4,'*2')	NINPRTT 2302
C		NINPRTT 2303
	IF (IUNITS.EQ.1) GO TO 500	NINPRTT 2304
C		NINPRTT 2305
	WRITE(6,153) NFWD,NSTA,SPAN	NINPRTT 2306
	WRITE(6,155) CD,ADUMP	NINPRTT 2307
	TEM = TTIO(1) + 460.	NINPRTT 2308
	WRITE(6,157) TEM,PTIO(1),PEX(ICHNL),WPLEN	NINPRTT 2309
	ITRBG = NFWD + 2	NINPRTT 2310
	WRITE(6,154) ICHNL,ITRBG	NINPRTT 2311
	DO 118 I = 1,NSTA,20	NINPRTT 2312
	IP18 = I + 18	NINPRTT 2313
	IF (IP18.GT.NSTA) IP18 = NSTA	NINPRTT 2314
	IF (I.EQ.1) WRITE(6,156) (J,J=I,IP18,2)	NINPRTT 2315
	IF (I.GT.1) WRITE(6,159) (J,J=I,IP18,2)	NINPRTT 2316
	ID = 0	NINPRTT 2317
	DO 104 J = I,IP18,2	NINPRTT 2318
	ID = ID + 1	NINPRTT 2319
	DUM1(ID) = RP(J)	NINPRTT 2320
	NFLUID(J) = 5*J	NINPRTT 2321
104	CONTINUE	NINPRTT 2322
	WRITE(6,158) (NFLUID(J),J=I,IP18,2)	NINPRTT 2323
	ID = 0	NINPRTT 2324
	DO 116 J = I,IP18,2	NINPRTT 2325
	ID = ID + 1	NINPRTT 2326
	NOS = NFLUID(J) - 4	NINPRTT 2327
	IF (NOS.GT.1) GO TO 106	NINPRTT 2328
	XOS = 0.0	NINPRTT 2329
	XJN = 0.0	NINPRTT 2330
	XMM = 0.0	NINPRTT 2331
	XIS = 0.0	NINPRTT 2332
	XCC = 0.0	NINPRTT 2333
	GO TO 108	NINPRTT 2334
106	XOS = XOS + DLX(NOS)	NINPRTT 2335
	XJN = XJN + DLX(NOS+1)	NINPRTT 2336
	XMM = XMM + DLX(NOS+2)	NINPRTT 2337
	XIS = XIS + DLX(NOS+3)	NINPRTT 2338
	XCC = XCC + DLX(NOS+4)	NINPRTT 2339
108	CONTINUE	NINPRTT 2340

DUM2(ID) = XOS	NINPRTT 2341
DUM25(ID) = XJN	NINPRTT 2342
DUM3(ID) = XMM	NINPRTT 2343
DUM4(ID) = XIS	NINPRTT 2344
DUM5(ID) = XCC	NINPRTT 2345
DUM55(ID) = TAU(NOS)	NINPRTT 2346
DUM6(ID) = TAU(NOS+2)	NINPRTT 2347
NOS = NFLUID(J)	NINPRTT 2348
DUM7(ID) = TAU(NOS)	NINPRTT 2349
DUM8(ID) = A(NOS)	NINPRTT 2350
DUM9(ID) = DH(J)	NINPRTT 2351
DUM10(ID) = DHJ(J)	NINPRTT 2352
DUM11(ID) = CNUM(J)	NINPRTT 2353
DUM12(ID) = AJET(J)	NINPRTT 2354
DUM16(ID) = THUBIN(J) - 460.	NINPRTT 2355
DUM17(ID) = QHUBIN(J)	NINPRTT 2356
DUM18(ID) = TTIPIN(J) - 460.	NINPRTT 2357
DUM19(ID) = QTIPIN(J)	NINPRTT 2358
NOS = NFLUID(J) - 4	NINPRTT 2359
DUM13(ID) = TG(J) - 460.	NINPRTT 2360
DUM14(ID) = HG(J)	NINPRTT 2361
JHCAL = IHC(J)	NINPRTT 2362
DUM15(ID) = HCAL(JHCAL)	NINPRTT 2363
IF (BTA.GT..01) DUM14(ID) = QG(J)	NINPRTT 2364
116 CONTINUE	NINPRTT 2365
WRITE(6,160) (DUM1(J),J=1,ID)	NINPRTT 2366
WRITE(6,162) (DUM2(J),J=1,ID)	NINPRTT 2367
WRITE(6,163) (DUM25(J),J=1,ID)	NINPRTT 2368
WRITE(6,164) (DUM3(J),J=1,ID)	NINPRTT 2369
WRITE(6,166) (DUM4(J),J=1,ID)	NINPRTT 2370
WRITE(6,168) (DUM5(J),J=1,ID)	NINPRTT 2371
WRITE(6,169) (DUM55(J),J=1,ID)	NINPRTT 2372
WRITE(6,170) (DUM6(J),J=1,ID)	NINPRTT 2373
WRITE(6,172) (DUM7(J),J=1,ID)	NINPRTT 2374
WRITE(6,174) (DUM8(J),J=1,ID)	NINPRTT 2375
WRITE(6,176) (DUM9(J),J=1,ID)	NINPRTT 2376
WRITE(6,178) (DUM10(J),J=1,ID)	NINPRTT 2377
WRITE(6,180) (DUM11(J),J=1,ID)	NINPRTT 2378
WRITE(6,182) (DUM12(J),J=1,ID)	NINPRTT 2379
WRITE(6,183) (DUM15(J),J=1,ID)	NINPRTT 2380
WRITE(6,184) (DUM13(J),J=1,ID)	NINPRTT 2381
IF (BTA.LT..01) WRITE(6,186) (DUM14(J),J=1,ID)	NINPRTT 2382
IF (BTA.GT..01) WRITE(6,188) (DUM14(J),J=1,ID)	NINPRTT 2383
IF (ICHNL.GT.1) GO TO 118	NINPRTT 2384
IF (IHUB.EQ.1) WRITE(6,196) (DUM16(J),J=1,ID)	NINPRTT 2385
IF (IHUB.EQ.3) WRITE(6,198) (DUM17(J),J=1,ID)	NINPRTT 2386
IF (ITIP.EQ.1) WRITE(6,202) (DUM18(J),J=1,ID)	NINPRTT 2387
IF (ITIP.EQ.3) WRITE(6,204) (DUM19(J),J=1,ID)	NINPRTT 2388
118 CONTINUE	NINPRTT 2389
ITRBG = NFWD + 1	NINPRTT 2390
WRITE(6,190) ICHNL,ITRBG	NINPRTT 2391
XOS = 0.0	NINPRTT 2392
XJN = 0.0	NINPRTT 2393
XMM = 0.0	NINPRTT 2394
XIS = 0.0	NINPRTT 2395
XCC = 0.0	NINPRTT 2396
DO 140 I = 2,NSTA,20	NINPRTT 2397
IP18 = I + 18	NINPRTT 2398
IF (IP18.GT.NSTA) IP18 = NSTA-1	NINPRTT 2399
IF (I.EQ.2) WRITE(6,156) (J,J=I,IP18,2)	NINPRTT 2400

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IF (I.GT.2) WRITE(6,159) (J,J=I,IP18,2)
ID = 0
DO 122 J = I,IP18,2
ID = ID + 1
DUM1(ID) = RR(J)
NFLUID(J) = 5*J
122 CONTINUE
WRITE(6,158) (NFLUID(J),J=I,IP18,2)
ID = 0
DO 130 J = I,IP18,2
ID = ID + 1
NOS = NFLUID(J) - 4
XOS = XOS + DLX(NOS)
XJN = XJN + DLX(NOS+1)
XMM = XMM + DLX(NOS+2)
XIS = XIS + DLX(NOS+3)
XCC = XCC + DLX(NOS+4)
DUM2(ID) = XOS
DUM25(ID) = XJN
DUM3(ID) = XMM
DUM4(ID) = XIS
DUM5(ID) = XCC
DUM55(ID) = TAU(NOS)
DUM6(ID) = TAU(NOS+2)
NOS = NFLUID(J)
DUM7(ID) = TAU(NOS)
DUM8(ID) = A(NOS)
DUM9(ID) = DH(J)
DUM10(ID) = DHJ(J)
DUM11(ID) = CNUM(J)
DUM12(ID) = AJET(J)
DUM16(ID) = THUBIN(J) - 460.
DUM17(ID) = QHUBIN(J)
DUM18(ID) = TTIPIN(J) - 460.
DUM19(ID) = QTIPIN(J)
NOS = NFLUID(J) - 4
DUM13(ID) = TG(J) - 460.
DUM14(ID) = HG(J)
JHCAL = IHC(J)
DUM15(ID) = HCAL(JHCAL)
130 IF (BTA.GT..01) DUM14(ID) = QG(J)
CONTINUE
WRITE(6,160) (DUM1(J),J=1,ID)
WRITE(6,162) (DUM2(J),J=1,ID)
WRITE(6,163) (DUM25(J),J=1,ID)
WRITE(6,164) (DUM3(J),J=1,ID)
WRITE(6,166) (DUM4(J),J=1,ID)
WRITE(6,168) (DUM5(J),J=1,ID)
WRITE(6,169) (DUM55(J),J=1,ID)
WRITE(6,170) (DUM6(J),J=1,ID)
WRITE(6,172) (DUM7(J),J=1,ID)
WRITE(6,174) (DUM8(J),J=1,ID)
WRITE(6,176) (DUM9(J),J=1,ID)
WRITE(6,178) (DUM10(J),J=1,ID)
WRITE(6,180) (DUM11(J),J=1,ID)
WRITE(6,182) (DUM12(J),J=1,ID)
WRITE(6,183) (DUM15(J),J=1,ID)
WRITE(6,184) (DUM13(J),J=1,ID)
IF (BTA.LT..01) WRITE(6,186) (DUM14(J),J=1,ID)
IF (BTA.GT..01) WRITE(6,188) (DUM14(J),J=1,ID)

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      IF (ICHNL.GT.1) GO TO 140
      IF (IHUB.EQ.1) WRITE(6,196) (DUM16(J),J=1,ID)
      IF (IHUB.EQ.3) WRITE(6,198) (DUM17(J),J=1,ID)
      IF (ITIP.EQ.1) WRITE(6,202) (DUM18(J),J=1,ID)
      IF (ITIP.EQ.3) WRITE(6,204) (DUM19(J),J=1,ID)
140  CONTINUE
150  FORMAT(1H1,46X,'INPUT FOR SLICE NUMBER',I3)
142  FORMAT(21X,' HUB TEMPERATURES ARE SPECIFIED')
144  FORMAT(21X,' ADIABATIC HUB SPECIFIED')
146  FORMAT(21X,' HUB HEAT FLUX IS SPECIFIED')
147  FORMAT(21X,' TIP TEMPERATURES ARE SPECIFIED')
148  FORMAT(21X,' ADIABATIC TIP SPECIFIED')
149  FORMAT(21X,' TIP HEAT FLUX IS SPECIFIED')
153  FORMAT(/' NUMBER OF STATIONS IN IMPINGEMENT REGION IS',I3,
Z      ', TOTAL NUMBER OF STATIONS IS',I3,
Z      ', SPAN OF THIS SLICE IS',F6.3,' IN')
155  FORMAT(' IMPINGEMENT HOLE DISCHARGE COEF.='F6.3,
Z      ', AREA OF DUMP TO TRAILING EDGE ='F8.5,' IN**2')
157  FORMAT(' COOLANT INLET TEMP.='F7.1,' R, COOLANT INLET PRESSURE',
Z      ' ='F6.1,' PSIA, EXIT PRESSURE ='F6.1,' LBM/HR')
Z      F6.1,' PSIA,/' COOLANT FLOW ='F6.1,' LBM/HR')
154  FORMAT(/' PRESSURE SIDE, SLICE ',I2,', TRAILING EDGE REGION ',
Z      ' BEGINS AT STATION-',I3)
156  FORMAT(/' STATION NUMBER',5X,10(6X,I4))
158  FORMAT(' COOLANT NODE NUMBER',10(6X,I4))
159  FORMAT(1H2,/' STATION NUMBER',5X,10(6X,I4))
160  FORMAT(' RADIAL LOCATION (IN)',10F10.3)
162  FORMAT(' X, OUTSIDE SUR. (IN)',10F10.5)
163  FORMAT(' X, INTERFACE (IN)',10F10.5)
164  FORMAT(' X, MID-METAL (IN)',10F10.5)
166  FORMAT(' X, INSIDE SURF. (IN)',10F10.5)
168  FORMAT(' X, MID.COOL.CH. (IN)',10F10.5)
169  FORMAT(/' COATING THKNSS (IN)',10F10.5)
170  FORMAT(' WALL THICKNESS (IN)',10F10.5)
172  FORMAT(' CHANNEL WIDTH (IN)',10F10.5)
174  FORMAT(' CHANNEL AREA(IN**2)',10F10.5)
176  FORMAT(' CHANNEL HYD.DIA(IN)',10F10.5)
178  FORMAT(/' IMP.JET HYD.DIA(IN)',10F10.5)
180  FORMAT(' NO. OF IMP. JETS ',10F10.2)
182  FORMAT(' TOT.JET AREA(IN**2)',10F10.5)
183  FORMAT(/' TYPE OF HC CALC. ',10(6X,A4))
184  FORMAT(' OUTSIDE BC: TG,(F)',10F10.1)
186  FORMAT(' HG (BTU/HR/FT**2/R)',10F10.1)
188  FORMAT(' QG (BTU/HR/FT**2)',10F10.1)
190  FORMAT(1H1,/' SUCTION SIDE, SLICE ',I2,', TRAILING EDGE REGION',
Z      ' BEGINS AT STATION-',I3)
192  FORMAT(/' CLAD K(BTU/HR/FT/R)',10F10.3)
194  FORMAT(' METL K(BTU/HR/FT/R)',10F10.3)
196  FORMAT(' GIVEN HUB TEMP. (F)',10F10.1)
198  FORMAT(' QHUB (BTU/HR/FT**2)',10F10.1)
202  FORMAT(' GIVEN TIP TEMP. (F)',10F10.1)
204  FORMAT(' QTIP (BTU/HR/FT**2)',10F10.1)
C
      GO TO 350
C
500  SPANC = SPAN/CINCH(1)
      ADUMPC = ADUMP/(CINCH(1)**2)
      WRITE(6,553) NFWD,NSTA,SPANC
      WRITE(6,555) CD,ADUMPC
      TEM = (TTIO(1) + 460.)/1.8

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NINPRTT 2519
NINPRTT 2520

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	PTIOC = PTIO(1)/CPRSR(1)	NINPRTT 2521
	PEXC = PEX(ICHNL)/CPRSR(1)	NINPRTT 2522
	WPLENC = WPLEN/CMSFL(1)	NINPRTT 2523
	WRITE(6,557) TEM,PTIOC,PEXC,WPLENC	NINPRTT 2524
	ITRBG = NFW + 2	NINPRTT 2525
	WRITE(6,154) ICHNL,ITRBG	NINPRTT 2526
	DO 518 I = 1,NSTA,20	NINPRTT 2527
	IP18 = I + 18	NINPRTT 2528
	IF (IP18.GT.NSTA) IP18 = NSTA	NINPRTT 2529
	IF (I.EQ.1) WRITE(6,556) (J,J=I,IP18,2)	NINPRTT 2530
	IF (I.GT.1) WRITE(6,559) (J,J=I,IP18,2)	NINPRTT 2531
	ID = 0	NINPRTT 2532
	DO 504 J = I,IP18,2	NINPRTT 2533
	ID = ID + 1	NINPRTT 2534
	DUM1(ID) = RR(J)/CINCH(1)	NINPRTT 2535
	NFLUID(J) = 5*J	NINPRTT 2536
504	CONTINUE	NINPRTT 2537
	WRITE(6,558) (NFLUID(J),J=I,IP18,2)	NINPRTT 2538
	ID = 0	NINPRTT 2539
	DO 516 J = I,IP18,2	NINPRTT 2540
	ID = ID + 1	NINPRTT 2541
	NOS = NFLUID(J) - 4	NINPRTT 2542
	IF (NOS.GT.1) GO TO 506	NINPRTT 2543
	XOS = 0.0	NINPRTT 2544
	XJN = 0.0	NINPRTT 2545
	XMM = 0.0	NINPRTT 2546
	XIS = 0.0	NINPRTT 2547
	XCC = 0.0	NINPRTT 2548
	GO TO 508	NINPRTT 2549
506	XOS = XOS + DLX(NOS)/CINCH(1)	NINPRTT 2550
	XJN = XJN + DLX(NOS+1)/CINCH(1)	NINPRTT 2551
	XMM = XMM + DLX(NOS+2)/CINCH(1)	NINPRTT 2552
	XIS = XIS + DLX(NOS+3)/CINCH(1)	NINPRTT 2553
	XCC = XCC + DLX(NOS+4)/CINCH(1)	NINPRTT 2554
508	CONTINUE	NINPRTT 2555
	DUM2(ID) = XOS	NINPRTT 2556
	DUM25(ID) = XJN	NINPRTT 2557
	DUM3(ID) = XMM	NINPRTT 2558
	DUM4(ID) = XIS	NINPRTT 2559
	DUM5(ID) = XCC	NINPRTT 2560
	DUM55(ID) = TAU(NOS)/CINCH(1)	NINPRTT 2561
	DUM6(ID) = TAU(NOS+2)/CINCH(1)	NINPRTT 2562
	NOS = NFLUID(J)	NINPRTT 2563
	DUM7(ID) = TAU(NOS)/CINCH(1)	NINPRTT 2564
	DUM8(ID) = A(NOS)/(CINCH(1)**2)	NINPRTT 2565
	DUM9(ID) = DH(J)/CINCH(1)	NINPRTT 2566
	DUM10(ID) = DHJ(J)/CINCH(1)	NINPRTT 2567
	DUM11(ID) = CNUM(J)	NINPRTT 2568
	DUM12(ID) = AJET(J)/(CINCH(1)**2)	NINPRTT 2569
	DUM16(ID) = THUBIN(J)/1.8	NINPRTT 2570
	DUM17(ID) = QHUBIN(J)/CHFLX(1)	NINPRTT 2571
	DUM18(ID) = TTIPIN(J)/1.8	NINPRTT 2572
	DUM19(ID) = QTIPIN(J)/CHFLX(1)	NINPRTT 2573
	NOS = NFLUID(J) - 4	NINPRTT 2574
	DUM13(ID) = TG(J)/1.8	NINPRTT 2575
	DUM14(ID) = HG(J)/CHTC(1)	NINPRTT 2576
	JHCAL = IHC(J)	NINPRTT 2577
	DUM15(ID) = HCAL(JHCAL)	NINPRTT 2578
	IF (BTA.GT..01) DUM14(ID) = QG(J)/CHFLX(1)	NINPRTT 2579
516	CONTINUE	NINPRTT 2580

	WRITE(6,560) (DUM1(J),J=1,ID)	NINPRTT 2581
	WRITE(6,562) (DUM2(J),J=1,ID)	NINPRTT 2582
	WRITE(6,563) (DUM25(J),J=1,ID)	NINPRTT 2583
	WRITE(6,564) (DUM3(J),J=1,ID)	NINPRTT 2584
	WRITE(6,566) (DUM4(J),J=1,ID)	NINPRTT 2585
	WRITE(6,568) (DUM5(J),J=1,ID)	NINPRTT 2586
	WRITE(6,569) (DUM55(J),J=1,ID)	NINPRTT 2587
	WRITE(6,570) (DUM6(J),J=1,ID)	NINPRTT 2588
	WRITE(6,572) (DUM7(J),J=1,ID)	NINPRTT 2589
	WRITE(6,574) (DUM8(J),J=1,ID)	NINPRTT 2590
	WRITE(6,576) (DUM9(J),J=1,ID)	NINPRTT 2591
	WRITE(6,578) (DUM10(J),J=1,ID)	NINPRTT 2592
	WRITE(6,580) (DUM11(J),J=1,ID)	NINPRTT 2593
	WRITE(6,582) (DUM12(J),J=1,ID)	NINPRTT 2594
	WRITE(6,583) (DUM15(J),J=1,ID)	NINPRTT 2595
	WRITE(6,584) (DUM13(J),J=1,ID)	NINPRTT 2596
	IF (BTA.LT..01) WRITE(6,586) (DUM14(J),J=1,ID)	NINPRTT 2597
	IF (BTA.GT..01) WRITE(6,588) (DUM14(J),J=1,ID)	NINPRTT 2598
	IF (ICHNL.GT.1) GO TO 518	NINPRTT 2599
	IF (IHUB.EQ.1) WRITE(6,596) (DUM16(J),J=1,ID)	NINPRTT 2600
	IF (IHUB.EQ.3) WRITE(6,598) (DUM17(J),J=1,ID)	NINPRTT 2601
	IF (ITIP.EQ.1) WRITE(6,602) (DUM18(J),J=1,ID)	NINPRTT 2602
	IF (ITIP.EQ.3) WRITE(6,604) (DUM19(J),J=1,ID)	NINPRTT 2603
518	CONTINUE	NINPRTT 2604
	ITRBG = NFWD + 1	NINPRTT 2605
	WRITE(6,190) ICHNL,ITRBG	NINPRTT 2606
	XOS = 0.0	NINPRTT 2607
	XJN = 0.0	NINPRTT 2608
	XMM = 0.0	NINPRTT 2609
	XIS = 0.0	NINPRTT 2610
	XCC = 0.0	NINPRTT 2611
	DO 540 I = 2,NSTA,20	NINPRTT 2612
	IP18 = I + 18	NINPRTT 2613
	IF (IP18.GT.NSTA) IP18 = NSTA-1	NINPRTT 2614
	IF (I.EQ.2) WRITE(6,556) (J,J=I,IP18,2)	NINPRTT 2615
	IF (I.GT.2) WRITE(6,559) (J,J=I,IP18,2)	NINPRTT 2616
	ID = 0	NINPRTT 2617
	DO 522 J = I,IP18,2	NINPRTT 2618
	ID = ID + 1	NINPRTT 2619
	DUM1(ID) = RR(J)/CINCH(1)	NINPRTT 2620
	NFLUID(J) = 5*J	NINPRTT 2621
522	CONTINUE	NINPRTT 2622
	WRITE(6,558) (NFLUID(J),J=I,IP18,2)	NINPRTT 2623
	ID = 0	NINPRTT 2624
	DO 530 J = I,IP18,2	NINPRTT 2625
	ID = ID + 1	NINPRTT 2626
	NOS = NFLUID(J) - 4	NINPRTT 2627
	XOS = XOS + DLX(NOS)/CINCH(1)	NINPRTT 2628
	XJN = XJN + DLX(NOS+1)/CINCH(1)	NINPRTT 2629
	XMM = XMM + DLX(NOS+2)/CINCH(1)	NINPRTT 2630
	XIS = XIS + DLX(NOS+3)/CINCH(1)	NINPRTT 2631
	XCC = XCC + DLX(NOS+4)/CINCH(1)	NINPRTT 2632
	DUM2(ID) = XOS	NINPRTT 2633
	DUM25(ID) = XJN	NINPRTT 2634
	DUM3(ID) = XMM	NINPRTT 2635
	DUM4(ID) = XIS	NINPRTT 2636
	DUM5(ID) = XCC	NINPRTT 2637
	DUM55(ID) = TAU(NOS)/CINCH(1)	NINPRTT 2638
	DUM6(ID) = TAU(NOS+2)/CINCH(1)	NINPRTT 2639
	NOS = NFLUID(J)	NINPRTT 2640

DUM7 (ID) = TAU (NOS) / CINCH (1)	NINPRTT 2641
DUM8 (ID) = A (NOS) / (CINCH (1) **2)	NINPRTT 2642
DUM9 (ID) = DH (J) / CINCH (1)	NINPRTT 2643
DUM10 (ID) = DHJ (J) / CINCH (1)	NINPRTT 2644
DUM11 (ID) = CNUM (J)	NINPRTT 2645
DUM12 (ID) = AJET (J) / (CINCH (1) **2)	NINPRTT 2646
DUM16 (ID) = THUBIN (J) / 1.8	NINPRTT 2647
DUM17 (ID) = QHUBIN (J) / CHFLX (1)	NINPRTT 2648
DUM18 (ID) = TTIPIN (J) / 1.8	NINPRTT 2649
DUM19 (ID) = QTIPIN (J) / CHFLX (1)	NINPRTT 2650
NOS = NFLUID (J) - 4	NINPRTT 2651
DUM13 (ID) = TG (J) / 1.8	NINPRTT 2652
DUM14 (ID) = HG (J) / CHTC (1)	NINPRTT 2653
JHCAL = IHC (J)	NINPRTT 2654
DUM15 (ID) = HCAL (JHCAL)	NINPRTT 2655
IF (BTA.GT..01) DUM14 (ID) = QG (J) / CHFLX (1)	NINPRTT 2656
CONTINUE	NINPRTT 2657
WRITE (6,560) (DUM1 (J), J=1, ID)	NINPRTT 2658
WRITE (6,562) (DUM2 (J), J=1, ID)	NINPRTT 2659
WRITE (6,563) (DUM25 (J), J=1, ID)	NINPRTT 2660
WRITE (6,564) (DUM3 (J), J=1, ID)	NINPRTT 2661
WRITE (6,566) (DUM4 (J), J=1, ID)	NINPRTT 2662
WRITE (6,568) (DUM5 (J), J=1, ID)	NINPRTT 2663
WRITE (6,569) (DUM55 (J), J=1, ID)	NINPRTT 2664
WRITE (6,570) (DUM6 (J), J=1, ID)	NINPRTT 2665
WRITE (6,572) (DUM7 (J), J=1, ID)	NINPRTT 2666
WRITE (6,574) (DUM8 (J), J=1, ID)	NINPRTT 2667
WRITE (6,576) (DUM9 (J), J=1, ID)	NINPRTT 2668
WRITE (6,578) (DUM10 (J), J=1, ID)	NINPRTT 2669
WRITE (6,580) (DUM11 (J), J=1, ID)	NINPRTT 2670
WRITE (6,582) (DUM12 (J), J=1, ID)	NINPRTT 2671
WRITE (6,583) (DUM15 (J), J=1, ID)	NINPRTT 2672
WRITE (6,584) (DUM13 (J), J=1, ID)	NINPRTT 2673
IF (BTA.LT..01) WRITE (6,586) (DUM14 (J), J=1, ID)	NINPRTT 2674
IF (BTA.GT..01) WRITE (6,588) (DUM14 (J), J=1, ID)	NINPRTT 2675
IF (ICHNL.GT.1) GO TO 540	NINPRTT 2676
IF (IHUB.EQ.1) WRITE (6,596) (DUM16 (J), J=1, ID)	NINPRTT 2677
IF (IHUB.EQ.3) WRITE (6,598) (DUM17 (J), J=1, ID)	NINPRTT 2678
IF (ITIP.EQ.1) WRITE (6,602) (DUM18 (J), J=1, ID)	NINPRTT 2679
IF (ITIP.EQ.3) WRITE (6,604) (DUM19 (J), J=1, ID)	NINPRTT 2680
CONTINUE	NINPRTT 2681
553 FORMAT (' NUMBER OF STATIONS IN IMPINGEMENT REGION IS', I3,	NINPRTT 2682
Z ' , TOTAL NUMBER OF STATIONS IS', I3,	NINPRTT 2683
Z ' , SPAN OF THIS SLICE IS', F6.3, ' CM')	NINPRTT 2684
555 FORMAT (' IMPINGEMENT HOLE DISCHARGE COEF.=', F6.3,	NINPRTT 2685
Z ' , AREA OF DUMP TO TRAILING EDGE =', F8.5, ' CM**2')	NINPRTT 2686
557 FORMAT (' COOLANT INLET TEMP.=', F7.1, ' K, COOLANT INLET',	NINPRTT 2687
Z ' PRESSURE =', F7.1, ' KPA, EXIT PRESSURE =',	NINPRTT 2688
Z F7.1, ' KPA, ' / ' COOLANT FLOW =', F6.1, ' KG/HR')	NINPRTT 2689
556 FORMAT (' STATION NUMBER', 5X, 10 (6X, I4))	NINPRTT 2690
558 FORMAT (' COOLANT NODE NUMBER', 10 (6X, I4))	NINPRTT 2691
559 FORMAT (1H2 / ' STATION NUMBER', 5X, 10 (6X, I4))	NINPRTT 2692
560 FORMAT (' RADIAL LOCATION (CM)', 10F10.3)	NINPRTT 2693
562 FORMAT (' X, OUTSIDE SUR. (CM)', 10F10.5)	NINPRTT 2694
563 FORMAT (' X, INTERFACE (CM)', 10F10.5)	NINPRTT 2695
564 FORMAT (' X, MID-METAL (CM)', 10F10.5)	NINPRTT 2696
566 FORMAT (' X, INSIDE SURF. (CM)', 10F10.5)	NINPRTT 2697
568 FORMAT (' X, MID.COOL.CH. (CM)', 10F10.5)	NINPRTT 2698
569 FORMAT (' COATING THKNSS (CM)', 10F10.5)	NINPRTT 2699
570 FORMAT (' WALL THICKNESS (CM)', 10F10.5)	NINPRTT 2700

572	FORMAT(' CHANNEL WIDTH (CM) ',10F10.5)	NINPRTT 2701
574	FORMAT(' CHANNEL AREA(CM**2) ',10F10.5)	NINPRTT 2702
576	FORMAT(' CHANNEL HYD.DIA(CM) ',10F10.5)	NINPRTT 2703
578	FORMAT('/' IMP.JET HYD.DIA(CM) ',10F10.5)	NINPRTT 2704
580	FORMAT(' NO. OF IMP. JETS ',10F10.2)	NINPRTT 2705
582	FORMAT(' TOT.JET AREA(CM**2) ',10F10.5)	NINPRTT 2706
583	FORMAT('/' TYPE OF HC CALC. ',10(6X,A4))	NINPRTT 2707
584	FORMAT(' OUTSIDE BC: TG,(K) ',10F10.1)	NINPRTT 2708
586	FORMAT(' HG (W/M**2/K) ',10F10.1)	NINPRTT 2709
588	FORMAT(' QG (W/M**2) ',10F10.1)	NINPRTT 2710
592	FORMAT('/' CLAD K (W/M/K) ',10F10.3)	NINPRTT 2711
594	FORMAT(' METAL K (W/M/K) ',10F10.3)	NINPRTT 2712
596	FORMAT(' GIVEN HUB TEMP. (K) ',10F10.1)	NINPRTT 2713
598	FORMAT(' QHUB (W/M**2) ',10F10.1)	NINPRTT 2714
602	FORMAT(' GIVEN TIP TEMP. (K) ',10F10.1)	NINPRTT 2715
604	FORMAT(' QTIP (W/M**2) ',10F10.1)	NINPRTT 2716
C		NINPRTT 2717
350	CONTINUE	NINPRTT 2718
	RETURN	NINPRTT 2719
	END	NINPRTT 2720

C----	SOURCE.NPARAYT	NPARAYT 2721
	SUBROUTINE PARRAY(JS,JSENS,ICHOKE)	NPARAYT 2722
C		NPARAYT 2723
C-	SOURCE.NPARAYT----	NPARAYT 2724
C+++	A SUBROUTINE TO SET UP THE COEF ARRAY TO SOLVE FOR BLADE PRESSURES	NPARAYT 2725
C		NPARAYT 2726
	REAL*8 TCOF	NPARAYT 2727
C		NPARAYT 2728
	COMMON /MATRX/ TCOF(400,30)	NPARAYT 2729
C		NPARAYT 2730
	COMMON /PRPS/ CPO, GAMO, DP(80), SP(80), RE(80),	NPARAYT 2731
Z	CPC(80), GAMC(80), DUMR1(80), DUMR2(80)	NPARAYT 2732
C		NPARAYT 2733
	COMMON /TCO/ ADUMP, BTA, CD, CP,	NPARAYT 2734
Z	GAM, PIM, R, SPAN, TOG,	NPARAYT 2735
Z	WDUMP, WIM, AKC(15,80), AKW(15,80),	NPARAYT 2736
Z	A(400), AJET(80), AM2(80), CNUM(80),	NPARAYT 2737
Z	DH(80), DHF(80), DHJ(80),	NPARAYT 2738
Z	DLX(400), FF(80), HC(80), HG(80),	NPARAYT 2739
Z	P(2,15,80), PEXIT(15), PUMP(80), QG(80),	NPARAYT 2740
Z	QSNK(80), RR(80), S(15), T(2,15,400),	NPARAYT 2741
Z	TG(80), TAU(400), WFC(80),	NPARAYT 2742
Z	WJ(15,80), WCROS(2,15,80), XN(80),	NPARAYT 2743
Z	ICOR, IFILM, IHUB, ITIP,	NPARAYT 2744
Z	ISBLOK, ISLICE, NBLKSZ, NSLICE,	NPARAYT 2745
Z	NFWD, NSTA, IHC(80)	NPARAYT 2746
C		NPARAYT 2747
	COMMON /TRNSNT/ RHOC, RHOM, SPHTC, SPHTM,	NPARAYT 2748
Z	DLTIME, TYME, TEPS, TYMMAX	NPARAYT 2749
C		NPARAYT 2750
	DIMENSION POLD(80), PSAV(5)	NPARAYT 2751
C		NPARAYT 2752
C	COMPUTE NEW PRESSURES	NPARAYT 2753
C		NPARAYT 2754
C	IFNL = THE NUMBER OF FLOW CHANNEL NODES	NPARAYT 2755
C		NPARAYT 2756
	TREPS = 1.0	NPARAYT 2757
	IF (TYME.GE.0.) TREPS = TEPS	NPARAYT 2758
800	IFNL = NSTA - 3	NPARAYT 2759
	NODST = 5*NSTA	NPARAYT 2760

NODSF = 5*NFWD	NPARAYT 2761
C	NPARAYT 2762
C INITIALIZE COEFFICIENT ARRAY TO 0.0	NPARAYT 2763
C	NPARAYT 2764
DO 810 I = 1,IFNL	NPARAYT 2765
DO 810 J = 1,30	NPARAYT 2766
810 TCOF(I,J) = 0.0	NPARAYT 2767
C	NPARAYT 2768
C COMPUTE THE COEFFICIENT VALUES	NPARAYT 2769
C	NPARAYT 2770
DO 900 I = 1,IFNL	NPARAYT 2771
FILM = 0.0	NPARAYT 2772
820 ICHK = I - 2*(I/2)	NPARAYT 2773
C	NPARAYT 2774
C FOR THE IMPINGEMENT REGION:	NPARAYT 2775
C ICHK = 0 IMPLIES I IS EVEN AND STATION IS ON SUCTION SIDE	NPARAYT 2776
C = 1 IMPLIES THAT I IS ODD AND STATION IS ON PRESSURE SIDE	NPARAYT 2777
C	NPARAYT 2778
C DEFINE THE REAL NODE NUMBER IN TERMS OF I	NPARAYT 2779
C WHERE IRL IS THE PIVOTAL ELEMENT = COOLANT NODE NUMBER, LCOOL	NPARAYT 2780
C IDN = DOWNSTREAM COOLANT NODE	NPARAYT 2781
C IUP = UPSTREAM COOLANT NODE	NPARAYT 2782
C	NPARAYT 2783
IF (I.LT.NFWD) GO TO 840	NPARAYT 2784
IF (I.EQ.NFWD) GO TO 890	NPARAYT 2785
C	NPARAYT 2786
C FOR I=NFWD, THE NODE IS THE ENTRANCE TO THE TRAILING EDGE AND IS	NPARAYT 2787
C TREATED SEPARATELY AT (890)	NPARAYT 2788
C FOR I>NFWD, THE NODE IS IN THE TRAILING EDGE AND IRL IS DEFINED AS:	NPARAYT 2789
C	NPARAYT 2790
IF (ICHK.GT.0) GO TO 885	NPARAYT 2791
IRL = 5*I	NPARAYT 2792
IDN = IRL + 10	NPARAYT 2793
IDNS = I+2	NPARAYT 2794
IUP = IRL	NPARAYT 2795
IUPS = IDNS - 2	NPARAYT 2796
ITC = 10	NPARAYT 2797
ITCP = 12	NPARAYT 2798
830 CONTINUE	NPARAYT 2799
GO TO 860	NPARAYT 2800
C	NPARAYT 2801
840 CONTINUE	NPARAYT 2802
IRL = 5*I	NPARAYT 2803
IF (I.GT.JS) GO TO 843	NPARAYT 2804
C	NPARAYT 2805
IF (I.LT.JS) GO TO 852	NPARAYT 2806
C	NPARAYT 2807
IF (ICHK.GT.0) GO TO 849	NPARAYT 2808
C	NPARAYT 2809
GO TO 855	NPARAYT 2810
C	NPARAYT 2811
843 IF (ICHK.GT.0) GO TO 849	NPARAYT 2812
C	NPARAYT 2813
C STATION I IS SUCTION SIDE, DOWNSTREAM OF SPLIT POINT	NPARAYT 2814
C	NPARAYT 2815
846 IUPS = I - 2	NPARAYT 2816
IDNS = I	NPARAYT 2817
IUP = IRL - 10	NPARAYT 2818
IDN = IRL	NPARAYT 2819
ITC = 8	NPARAYT 2820

ITCP = 10	NPARAYT 2821
IF (I.GT.2) GO TO 860	NPARAYT 2822
IUPS = 1	NPARAYT 2823
IUP = 5	NPARAYT 2824
ITC = 9	NPARAYT 2825
GO TO 860	NPARAYT 2826
C	NPARAYT 2827
C STATION I IS PRESSURE SIDE,DOWNSTREAM OF SPLIT POINT	NPARAYT 2828
C	NPARAYT 2829
849 CONTINUE	NPARAYT 2830
IUPS = I	NPARAYT 2831
IDNS = I + 2	NPARAYT 2832
IUP = IRL	NPARAYT 2833
IDN = IRL + 10	NPARAYT 2834
ITC = 10	NPARAYT 2835
ITCP = 12	NPARAYT 2836
GO TO 860	NPARAYT 2837
852 CONTINUE	NPARAYT 2838
IF (ICLK.GT.0) GO TO 858	NPARAYT 2839
IF (ICLK.NE.JSENS) GO TO 846	NPARAYT 2840
855 CONTINUE	NPARAYT 2841
C	NPARAYT 2842
C I IS ON SUCTION SIDE, FORWARD OF SPLIT POINT	NPARAYT 2843
C	NPARAYT 2844
IUPS = I	NPARAYT 2845
IDNS = I - 2	NPARAYT 2846
IUP = IRL	NPARAYT 2847
IDN = IRL - 10	NPARAYT 2848
IDX = IUP	NPARAYT 2849
ITC = 10	NPARAYT 2850
ITCP = 8	NPARAYT 2851
IF (I.GT.2) GO TO 860	NPARAYT 2852
IDNS = 1	NPARAYT 2853
IDN = 5	NPARAYT 2854
ITCP = 9	NPARAYT 2855
GO TO 860	NPARAYT 2856
858 CONTINUE	NPARAYT 2857
IF (ICLK.NE.JSENS) GO TO 849	NPARAYT 2858
IDNS = I	NPARAYT 2859
IUPS = I + 2	NPARAYT 2860
IDN = IRL	NPARAYT 2861
IUP = IRL + 10	NPARAYT 2862
IDX = IUP	NPARAYT 2863
ITC = 12	NPARAYT 2864
ITCP = 10	NPARAYT 2865
C	NPARAYT 2866
860 CONTINUE	NPARAYT 2867
C	NPARAYT 2868
C	NPARAYT 2869
TRTRM = 0.0	NPARAYT 2870
IF (DLTYME.GT.0.0.AND.TYME.GE.0.) TRTRM = 12.*DLX(IDN) *	NPARAYT 2871
Z (WCROS(2,ISLICE,IDNS)-WCROS(1,ISLICE,IDNS))/(DLTYME*A(IUP)*32.2)	NPARAYT 2872
WFCDUM = WFC(IDNS)	NPARAYT 2873
IF (I.GT.NFWD) WFCDUM = WFCDUM + WFC(IDNS+1)	NPARAYT 2874
IF (WCROS(2,ISLICE,IDNS).NE.0.0) FILM = WFCDUM/WCROS(2,ISLICE,IDNS)	NPARAYT 2875
TCOF(I,ITC) = TREPS*	NPARAYT 2876
Z ((1.0 + GAMC(IUPS)*AM2(IUPS)) + (A(IDN)-A(IUP))/(2.*A(IUP)))	NPARAYT 2877
TCOF(I,ITCP) = TREPS*(-(1.0 + .5*GAMC(IDNS)*AM2(IDNS)*	NPARAYT 2878
Z (4.*FF(IDNS)*DLX(IDX)/DH(IDNS)+2.+2.*FILM))*A(IDN)/A(IUP)	NPARAYT 2879
Z + (A(IDN)-A(IUP))/(2.*A(IUP)))	NPARAYT 2880

ROOT	= SQRT(32.2*GAMC(IDNS)*R*T(2,ISLICE,IDN)*AM2(IDNS))	NPARAYT	2881
PUMTRM	= 0.0	NPARAYT	2882
IF (ROOT.NE.0.0)	PUMTRM = (3.14159265*WS/30.)**2*	NPARAYT	2883
Z	RR(IDNS)*(RR(IDNS)-RR(IUPS))*WCROS(2,ISLICE,IDNS)	NPARAYT	2884
Z	/ (A(IUP)*ROOT*144.*32.2)	NPARAYT	2885
TCOF(I,20)	= -PUMTRM + TRTRM - (1.-TREPS)*	NPARAYT	2886
Z	(P(1,ISLICE,IUPS)*TCOF(I,ITC) + P(1,ISLICE,IDNS)*TCOF(I,ITCP))	NPARAYT	2887
870	CONTINUE	NPARAYT	2888
	IF (IDNS.NE.ICHOKE) GO TO 880	NPARAYT	2889
	TCOF(I,20) = -P(1,ISLICE,ICHOKE)*TCOF(I,12) + TCOF(I,20)	NPARAYT	2890
	TCOF(I,12) = 0.0	NPARAYT	2891
880	CONTINUE	NPARAYT	2892
C		NPARAYT	2893
C	FOR TRAILING EDGE CHANNELS:	NPARAYT	2894
C		NPARAYT	2895
	IF (I.LT.IFNL) GO TO 900	NPARAYT	2896
C		NPARAYT	2897
C	TCOF(I,20) IS NON-ZERO ONLY FOR I=IFNL	NPARAYT	2898
C		NPARAYT	2899
	IF (ICHOKE.EQ.NSTA-1) GO TO 900	NPARAYT	2900
	TCOF(I,20) = -PEXIT(ISLICE)*TCOF(I,12) + TCOF(I,20)	NPARAYT	2901
	TCOF(I,12) = 0.0	NPARAYT	2902
	GO TO 900	NPARAYT	2903
885	CONTINUE	NPARAYT	2904
C		NPARAYT	2905
C	FOR A PRESSURE SIDE, TRAILING EDGE REGION STATION, COOLANT NODE	NPARAYT	2906
C	IS IDENTICAL TO SUCTION SIDE NODE.	NPARAYT	2907
C		NPARAYT	2908
	TCOF(I,10) = 1.0	NPARAYT	2909
	TCOF(I,9) = -1.0	NPARAYT	2910
	TCOF(I,20) = 0.0	NPARAYT	2911
	GO TO 900	NPARAYT	2912
890	CONTINUE	NPARAYT	2913
C		NPARAYT	2914
C	FOR THE SPECIAL NODE AT THE ENTRANCE TO THE TRAILING EDGE:	NPARAYT	2915
C	ALLOWING FOR THE POSSIBILITY OF ADDITION OF EXTRA COOLING AIR	NPARAYT	2916
C	INTO TRAILING EDGE,	NPARAYT	2917
C		NPARAYT	2918
C		NPARAYT	2919
	TRTRM = 0.0	NPARAYT	2920
	IF (DLTYME.GT.0.0.AND.TYME.GE.0.) TRTRM=12.*DLX(NFWD+1)*	NPARAYT	2921
Z	(WCROS(2,ISLICE,NFWD+1)-WCROS(1,ISLICE,NFWD+1))/	NPARAYT	2922
Z	(DLTYME*A(NODSF+5)*32.2)	NPARAYT	2923
	AVRGA = (A(NODSF-5) + A(NODSF) - A(NODSF+5))/(3.*A(NODSF+5))	NPARAYT	2924
	TCOF(I,9) = TREPS*((1. + GAMC(NFWD-1)*AM2(NFWD-1))*	NPARAYT	2925
Z	A(NODSF-5)/A(NODSF+5) - AVRGA)	NPARAYT	2926
	TCOF(I,10) = TREPS*((1. + GAMC(NFWD)*AM2(NFWD))*	NPARAYT	2927
Z	A(NODSF)/A(NODSF+5) - AVRGA)	NPARAYT	2928
	IF (WCROS(2,ISLICE,NFWD+1).NE.0.0) FILM =	NPARAYT	2929
Z	(WFC(NFWD+1)+WFC(NFWD+2))/WCROS(2,ISLICE,NFWD+1)	NPARAYT	2930
	TCOF(I,11) = TREPS*(-1. - GAMC(NFWD+1)*AM2(NFWD+1)*	NPARAYT	2931
Z	(1. + 2.*FF(NFWD+1)*DLX(NODSF+5)/DH(NFWD+1)+FILM) - AVRGA)	NPARAYT	2932
C		NPARAYT	2933
	PUMP(NFWD+1) = (3.14159265*WS/30.)**2*	NPARAYT	2934
Z	RR(NFWD+1)*(RR(NFWD+1)-RR(NFWD))	NPARAYT	2935
	ROOT = SQRT(32.2*GAMC(NFWD+1)*R*	NPARAYT	2936
Z	T(2,ISLICE,NODSF+5)*AM2(NFWD+1))	NPARAYT	2937
	PUMTRM = 0.0	NPARAYT	2938
	IF (ROOT.NE.0.0) PUMTRM = (3.14159265*WS/30.)**2*RR(NFWD+1)*	NPARAYT	2939
Z	(RR(NFWD+1)-RR(NFWD))*WCROS(2,ISLICE,NFWD+1)	NPARAYT	2940

Z	/ (A (NODSF+5) *ROOT*144.*32.2)	NPARAYT 2941
C		NPARAYT 2942
C	PUMP HAS UNITS OF (IN**2/SEC**2); ROOT HAS UNITS OF (FT/SEC)	NPARAYT 2943
C		NPARAYT 2944
	DUMTER = 0.0	NPARAYT 2945
	IF (ADUMP.GT.0.) DUMTER = - WDUMP**2*R*	NPARAYT 2946
Z	(T (2,ISLICE,NODSF-5)+T (2,ISLICE,NODSF)) /	NPARAYT 2947
Z	((P (1,ISLICE,NFWD-1) + P (1,ISLICE,NFWD)) *ADUMP*A (NODSF+5) *32.2)	NPARAYT 2948
	TCOF (I,20) = - PUMTRM + DUMTER + TRTRM	NPARAYT 2949
Z	- (1.0-TREPS) * (P (1,ISLICE,NFWD-1) *TCOF (I,9)	NPARAYT 2950
Z	+ P (1,ISLICE,NFWD) *TCOF (I,10) + P (1,ISLICE,NFWD+1) *TCOF (I,11))	NPARAYT 2951
900	CONTINUE	NPARAYT 2952
C		NPARAYT 2953
	RETURN	NPARAYT 2954
	END	NPARAYT 2955

C----	SOURCE.NPLENMP	NPLENMP 2956
	SUBROUTINE PLNUM (WXX,PXX,PTEXT,TTX,TTEXT)	NPLENMP 2957
C		NPLENMP 2958
C-	SOURCE.NPLENMP----	NPLENMP 2959
C	A SUBROUTINE TO COMPUTE PRESSURE DROP IN THE CENTRAL COOLANT PLENUM	NPLENMP 2960
C		NPLENMP 2961
C		NPLENMP 2962
C		NPLENMP 2963
C		NPLENMP 2964
C	-----	NPLENMP 2965
C	-	NPLENMP 2966
C	ARGUMENTS FOR THIS SUBROUTINE ARE:	NPLENMP 2967
C		NPLENMP 2968
C	WXX = MASS FLOW RATE INTO THIS SLICE, LBM/HR	NPLENMP 2969
C	PXX = AVERAGE STATIC PRESSURE FOR THIS PLENUM SLICE, PSIA,	NPLENMP 2970
C	CALCULATED IN THIS SUBROUTINE.	NPLENMP 2971
C	PTEXT = TOTAL PRESSURE IN AND TOTAL PRESSURE OUT, PSIA	NPLENMP 2972
C	TTX = AVERAGE STATIC TEMPERATURE FOR THIS PLENUM SLICE, (F),	NPLENMP 2973
C	CALCULATED IN THIS SUBROUTINE	NPLENMP 2974
C	TTEXT = TOTAL TEMP. IN AND TOTAL TEMP.OUT, (F)	NPLENMP 2975
C	-----	NPLENMP 2976
C		NPLENMP 2977
C		NPLENMP 2978
C		NPLENMP 2979
	COMMON /RADL/ APLN (15), DPLN (15), RIN (15), ROUT (15),	NPLENMP 2980
Z	PIN (15), TIN (15), W (15), WS	NPLENMP 2981
C		NPLENMP 2982
	COMMON /TCO/ ADUMP, BTA, CD, CP,	NPLENMP 2983
Z	GAM, PIM, R, SPAN, TOG,	NPLENMP 2984
Z	WDUMP, WIM, AKC (15,80), AKW (15,80),	NPLENMP 2985
Z	A (400), AJET (80), AM2 (80), CNUM (80),	NPLENMP 2986
Z	DH (80), DHF (80), DHJ (80),	NPLENMP 2987
Z	DLX (400), FF (80), HC (80), HG (80),	NPLENMP 2988
Z	P (2,15,80), PEXIT (15), PUMP (80), QG (80),	NPLENMP 2989
Z	QSNK (80), RR (80), S (15), T (2,15,400),	NPLENMP 2990
Z	TG (80), TAU (400), WFC (80),	NPLENMP 2991
Z	WJ (15,80), WCROS (2,15,80), XN (80),	NPLENMP 2992
Z	ICOR, IFILM, IHUB, ITIP,	NPLENMP 2993
Z	ISBLOK, ISLICE, NBLKSZ, NSLICE,	NPLENMP 2994
Z	NFWD, NSTA, IHC (80)	NPLENMP 2995
C		NPLENMP 2996
	COMMON /TRANSNT/ RHOC, RHOM, SPHTC, SPHTM,	NPLENMP 2997
Z	DLTYME, TYME, TEPS, TYMMAX	NPLENMP 2998
C		NPLENMP 2999
	COMMON /UNITS/ CINCH (2), CHTC (2), CHPLX (2), CPRSR (2), CMSFL (2),	NPLENMP 3000

Z	CTHPP (2) , CTCON (2) , CDEN (2) , CSPHT (2) , CGASC (2) ,	NPLENMP 3001
Z	CVISC (2) , CRHOVG (2) , IUNITS	NPLENMP 3002
C		NPLENMP 3003
	DIMENSION BETTA (20) , B (20) , AMC (20) , SIGMA (20) , TT1 (20) , F1 (20) ,	NPLENMP 3004
	1 Z1 (15) , CH (15)	NPLENMP 3005
	DIMENSION SV (3) , XK (4) , XL (4)	NPLENMP 3006
C		NPLENMP 3007
C----	PUNP (FF) IS THE EQUATION FOR DELTA P OVER LENGTH DX	NPLENMP 3008
C		NPLENMP 3009
	FUNP (FF) = (D1*RRP* (PP/R/TP-V1) /144.0-2.*FF*G2*TP/PP/AA/AA/DD)	NPLENMP 3010
Z	/ (1.-TP*G2/ (PP*AA) **2+G1*CP	NPLENMP 3011
Z	*778.161*R*TP*TP*V1/ (PP*AA) **2/PP) *DX	NPLENMP 3012
C		NPLENMP 3013
C----	FUNT (XK) IS THE EQUATION FOR DELTA T OVER LENGTH DX	NPLENMP 3014
C		NPLENMP 3015
	FUNT (XK) = (D2*RRP/CP+G1*R* (TP/PP/AA) **2* (XK/PP/DX))	NPLENMP 3016
Z	/ (1.+G1*R*TP/ (PP*AA) **2) *DX	NPLENMP 3017
C		NPLENMP 3018
C	INITIALIZE	NPLENMP 3019
1	CONTINUE	NPLENMP 3020
	DIFTOL=0.005	NPLENMP 3021
	ACH=1.	NPLENMP 3022
	KSIG=0	NPLENMP 3023
	NCC=1	NPLENMP 3024
	IS=0	NPLENMP 3025
	KTR1=0	NPLENMP 3026
	W (ISLICE) = WXX	NPLENMP 3027
C		NPLENMP 3028
C	SAVE INLET TOTAL PRESSURE (PSIA) IN PIN AND INLET TOTAL	NPLENMP 3029
C	TEMPERATURE (F) IN TIN	NPLENMP 3030
C		NPLENMP 3031
	PIN (ISLICE) = PTEXTIT	NPLENMP 3032
	TIN (ISLICE) = TTEXTIT	NPLENMP 3033
	CH (ISLICE) =0.0	NPLENMP 3034
	ZED=Z1 (ISLICE) *1.01	NPLENMP 3035
	IF (ZED.EQ.0.) ZED=.001	NPLENMP 3036
	IF (TIN (ISLICE) .GT.-430.0) GO TO 5	NPLENMP 3037
3	TIN (ISLICE) =50.0	NPLENMP 3038
5	SIGB=0.0	NPLENMP 3039
C		NPLENMP 3040
C		NPLENMP 3041
7	NSTNS= 4	NPLENMP 3042
	SEGMTS=NSTNS-1	NPLENMP 3043
C		NPLENMP 3044
C		NPLENMP 3045
	T1=TIN (ISLICE) +460.0	NPLENMP 3046
	B (1) =T1	NPLENMP 3047
	BETA1=PIN (ISLICE) **2	NPLENMP 3048
	BETTA (1) =BETA1	NPLENMP 3049
	DX=S (ISLICE) /SEGMTS	NPLENMP 3050
	DXTEMP=DX	NPLENMP 3051
	XXN=NSTNS	NPLENMP 3052
C		NPLENMP 3053
C		NPLENMP 3054
13	DR= (ROUT (ISLICE) -RIN (ISLICE)) /SEGMTS	NPLENMP 3055
C		NPLENMP 3056
	CCOMPUTE CONSTANT TERMS-C1-C8 -	NPLENMP 3057
		NPLENMP 3058
17	CONTINUE	NPLENMP 3059
	TTX=B (1)	NPLENMP 3060

CALL GASTBL(TTX,C,CP,GAM,PD,R,XMU)	NPLENMP 3061
J=1	NPLENMP 3062
C6=.5*(GAM-1.0)	NPLENMP 3063
C1=GAM/C6	NPLENMP 3064
C	NPLENMP 3065
C	NPLENMP 3066
IF (WS) 21,19,21	NPLENMP 3067
C NO PUMPING	NPLENMP 3068
19 C3=0.0	NPLENMP 3069
GO TO 23	NPLENMP 3070
C	NPLENMP 3071
C PUMPING	NPLENMP 3072
C	NPLENMP 3073
21 C3=2.36695E-6*(WS**2)/(C1*R)	NPLENMP 3074
23 C8=32.17*GAM*R	NPLENMP 3075
C5=1.0/SQRT(C8)	NPLENMP 3076
C7=1.0/(32.17*C1*R)	NPLENMP 3077
IF (J.GT.1) GO TO 33	NPLENMP 3078
25 CONTINUE	NPLENMP 3079
C	NPLENMP 3080
C COMPUTE CHANNEL REYNOLDS NO. IF J = 1	NPLENMP 3081
C	NPLENMP 3082
REY = 12.0*W(ISLICE)/XMU*DPLN(ISLICE)/APLN(ISLICE)	NPLENMP 3083
C	NPLENMP 3084
C COMPUTE FRICTION FACTOR	NPLENMP 3085
C	NPLENMP 3086
C COMPUTE Z TERMS	NPLENMP 3087
33 CONTINUE	NPLENMP 3088
Z3=12.0*W(ISLICE)/XMU	NPLENMP 3089
Z4=(R*W(ISLICE)/3600.0)**2	NPLENMP 3090
IF (J.GT.1) GO TO 77	NPLENMP 3091
C DETERMINE INLET CONDITIONS	NPLENMP 3092
35 CONTINUE	NPLENMP 3093
C	NPLENMP 3094
INITIAL STATION COMPUTATIONS -	NPLENMP 3095
C	NPLENMP 3096
BALANCING ON TOTAL PRESSURE -	NPLENMP 3097
C	NPLENMP 3098
39 NAG=-1	NPLENMP 3099
41 SIGC=(B(J)/APLN(ISLICE))**2*Z4/BETTA(J)	NPLENMP 3100
IF (ABS(SIGB-SIGC).LE..00001*SIGC) GO TO 57	NPLENMP 3101
C SIGMA NOT CONVERGED	NPLENMP 3102
43 IS=IS+1	NPLENMP 3103
SV(IS)=SIGC	NPLENMP 3104
IF (IS.EQ.3) GO TO 135	NPLENMP 3105
45 B(J)=T1-C7*SIGC	NPLENMP 3106
IF (B(J).LT.50.0) GO TO 159	NPLENMP 3107
C TEMP OK	NPLENMP 3108
47 SIGB=SIGC	NPLENMP 3109
BETTA(J)=BETA1*(B(J)/T1)**C1	NPLENMP 3110
GO TO 41	NPLENMP 3111
C	NPLENMP 3112
SIGMA CONVERGED	NPLENMP 3113
57 B(J)=T1-C7*SIGC	NPLENMP 3114
AMC(1)=SQRT(SIGC/B(J))*C5	NPLENMP 3115
IF (B(J).LE.0.0) GO TO 159	NPLENMP 3116
KTRBZ=0	NPLENMP 3117
63 BETTA(J)=BETA1/(1.0+C6*AMC(1)**2)**C1	NPLENMP 3118
IF (BETTA(J).LE.0.) GO TO 159	NPLENMP 3119
65 B(1)=T1/(1.0+C6*AMC(1)**2)	NPLENMP 3120

	SIGMA (1) = (B (J) /APLN (ISLICE)) **2*Z4/BETTA (J)	NPLENMP 3121
	SIGC=SQRT (SIGMA (1) /B (1)) *C5	NPLENMP 3122
	IF (ABS (SIGC-AMC (1)) .LE. .01) GO TO 71	NPLENMP 3123
67	AMC (1) =SIGC	NPLENMP 3124
69	KTRBZ=KTRBZ+1	NPLENMP 3125
	IF (KTRBZ.LE.20) GO TO 63	NPLENMP 3126
71	TT1 (1) =TIN (ISLICE)	NPLENMP 3127
		NPLENMP 3128
C	CHANNEL PRESSURE DROP -	NPLENMP 3129
		NPLENMP 3130
73	NAG = 1	NPLENMP 3131
	F1 (1) =REY	NPLENMP 3132
	SIGMA (2) =SIGMA (1) *.95	NPLENMP 3133
	J=2	NPLENMP 3134
	IS=0	NPLENMP 3135
77	CONTINUE	NPLENMP 3136
	AJ=J-1	NPLENMP 3137
	DR2=DR* (2.0* (RIN (ISLICE) +AJ*DR) -DR)	NPLENMP 3138
79	TT1 (J) =TT1 (J-1) +C3*DR2	NPLENMP 3139
	KSIG=0	NPLENMP 3140
	AZ=DPLN (ISLICE) /APLN (ISLICE)	NPLENMP 3141
	REY=Z3*AZ	NPLENMP 3142
	PP = SQRT (BETTA (1))	NPLENMP 3143
	SIGMA (1) =SQRT (SIGMA (1))	NPLENMP 3144
	BETTA (1) = PP	NPLENMP 3145
	TP = B (1)	NPLENMP 3146
	G2= (W (ISLICE) /3600.0) **2*R/32.174	NPLENMP 3147
	G1= G2/CP/778.161	NPLENMP 3148
	D1= (WS*3.1415927/30.0) **2*DR/DX/32.174	NPLENMP 3149
	D2= D1/778.161/144.0	NPLENMP 3150
	RRP = RIN (ISLICE)	NPLENMP 3151
	DO 97 J=2, NSTNS	NPLENMP 3152
	AZ=DPLN (ISLICE) /APLN (ISLICE)	NPLENMP 3153
	REY= Z3*AZ	NPLENMP 3154
	F1 (J) = .079*REY** (-.25)	NPLENMP 3155
	IF (REY.LT.2300.) F1 (J) = 16.0/REY	NPLENMP 3156
	PTEMP=BETTA (J-1)	NPLENMP 3157
	TTEMP=B (J-1)	NPLENMP 3158
	RTEMP = RRP	NPLENMP 3159
	MACH1=1	NPLENMP 3160
	XNN=2.0	NPLENMP 3161
	DD=DPLN (ISLICE)	NPLENMP 3162
	AA=APLN (ISLICE)	NPLENMP 3163
	GO TO 85	NPLENMP 3164
81	MACH1=XNN	NPLENMP 3165
	WRITE (6,83) ISLICE,J	NPLENMP 3166
83	FORMAT (5X,9H***** ,50HDECREASED INCREMENT DERIVATIVE CHANGING	NPLENMP 3167
	1 TOO FAST,3X,'BRANCH NO. ',I2,', STATION NO. ',I2/)	NPLENMP 3168
	XNN=XNN*2.0	NPLENMP 3169
	DX=DX/2.0	NPLENMP 3170
	PTEMP=BETTA (J-1)	NPLENMP 3171
	TTEMP=B (J-1)	NPLENMP 3172
	PP = PTEMP	NPLENMP 3173
	TP = TTEMP	NPLENMP 3174
	RRP =RTEMP	NPLENMP 3175
	DD= DPLN (ISLICE)	NPLENMP 3176
	AA= APLN (ISLICE)	NPLENMP 3177
85	DO 91 L=1,4	NPLENMP 3178
	V1=G1/PP/AA**2/ (1.0+G1*R*TP/ (PP*AA) **2)	NPLENMP 3179
	TERM1=TP*G2/ (PP*AA) **2	NPLENMP 3180

	TERM2=G1*CP*778.161*R*TP*TP*V1/(PP*AA)**2/PP	NPLENMP 3181
	TESTMA=1.0-TERM1+TERM2	NPLENMP 3182
	IF (TESTMA.LE.0.0) GO TO 159	NPLENMP 3183
	XK(L)= FUNP(F1(J))	NPLENMP 3184
	IF (L.EQ.1) GO TO 89	NPLENMP 3185
	DO 87 LL=2,L	NPLENMP 3186
	XTEST=ABS((XK(L)-XK(LL-1))/PP)	NPLENMP 3187
	IF (XTEST.GT.DIFTOL) GO TO 81	NPLENMP 3188
87	CONTINUE	NPLENMP 3189
89	XL(L)=FUNT(XK(L))	NPLENMP 3190
	IF (L.EQ.4) GO TO 93	NPLENMP 3191
	PP =PTEMP+XK(L)/2.0	NPLENMP 3192
	TP =TTEMP+XL(L)/2.0	NPLENMP 3193
	IF (L.EQ.2) GO TO 91	NPLENMP 3194
	RRP=RRP+DR/XNN	NPLENMP 3195
	IF (L.NE.3) GO TO 91	NPLENMP 3196
	PP =PTEMP+XK(L)	NPLENMP 3197
	TP =TTEMP+XL(L)	NPLENMP 3198
91	CONTINUE	NPLENMP 3199
93	PP =PTEMP+XK(L)	NPLENMP 3200
	TP =TTEMP+XL(L)	NPLENMP 3201
	IF (PP.LE.0.0.OR.TP.LE.0.0) GO TO 159	NPLENMP 3202
	V1=G1/PP/AA**2/(1.0+G1*R*TP/(PP*AA)**2)	NPLENMP 3203
	TERM1=TP*G2/(PP*AA)**2	NPLENMP 3204
	TERM2=G1*CP*778.161*R*TP*TP*V1/(PP*AA)**2/PP	NPLENMP 3205
	TESTMA=1.0-TERM1+TERM2	NPLENMP 3206
	IF (TESTMA.LE.0.0) GO TO 159	NPLENMP 3207
	BETTA(J)=PTEMP+(XK(1)+2.0*(XK(2)+XK(3))+XK(4))/6.0	NPLENMP 3208
	B(J)=TTEMP+(XL(1)+2.0*(XL(2)+XL(3))+XL(4))/6.0	NPLENMP 3209
	PP = BETTA(J)	NPLENMP 3210
	IF (B(J).LE.0.0.OR.BETTA(J).LE.0.0) GO TO 159	NPLENMP 3211
	TP =B(J)	NPLENMP 3212
	IF (MACH1.EQ.1) GO TO 95	NPLENMP 3213
	MACH1=MACH1-1	NPLENMP 3214
	PTEMP = PP	NPLENMP 3215
	TTEMP = TP	NPLENMP 3216
	GO TO 85	NPLENMP 3217
95	XNN=2.0	NPLENMP 3218
	DX=DXTEMP	NPLENMP 3219
	SIGMA(J)=B(J)/APLN(ISLICE)/BETTA(J)*SQRT(Z4)	NPLENMP 3220
	AMC(J)=SIGMA(J)*SQRT(1.0/B(J))*C5	NPLENMP 3221
	IF (AMC(J).GE.1.0) GO TO 159	NPLENMP 3222
	F1(J)=REY	NPLENMP 3223
	TT1(J)=B(J)*(1.0+C6*AMC(J)**2)-460.0	NPLENMP 3224
97	CONTINUE	NPLENMP 3225
C	ALL STATIONS COMPUTED	NPLENMP 3226
99	SIGC = 1.0	NPLENMP 3227
	AMC(NSTNS)=AMC(NSTNS)/SIGC	NPLENMP 3228
	IF (AMC(NSTNS).GT.1.0) GO TO 159	NPLENMP 3229
	BETTA(NSTNS)=BETTA(NSTNS)*SIGC**2	NPLENMP 3230
C	RESTART CHOKED BRANCH IF M.LT. .8	NPLENMP 3231
	IF (CH(ISLICE).EQ.0..OR.CH(ISLICE).EQ.1.) GO TO 113	NPLENMP 3232
	IF (ACH.EQ.(-1.0)) GO TO 113	NPLENMP 3233
	ACH=-1.	NPLENMP 3234
	AB=0.	NPLENMP 3235
	DO 109 J=1,NSTNS	NPLENMP 3236
	IF (AMC(J).GT..8) GO TO 113	NPLENMP 3237
	IF (AMC(J).LT.AB) GO TO 109	NPLENMP 3238
	AB=AMC(J)	NPLENMP 3239
109	CONTINUE	NPLENMP 3240

	CH(ISLICE)=0.0	NPLENMP 3241
	AJ=(GAM+1.)/2.	NPLENMP 3242
	CX=-(GAM+1.00)/(GAM-1.0)/2.0	NPLENMP 3243
	AZ=.95/AB*(1.0+C6*.90)**(CX)*(1.0+C6*AB**2)**(-CX)	NPLENMP 3244
	WCHOKE=W(ISLICE)	NPLENMP 3245
	W(ISLICE)=AZ*W(ISLICE)	NPLENMP 3246
	WRITE(6,111) ISLICE,W(ISLICE),WCHOKE	NPLENMP 3247
111	FORMAT(8X,6H*****,23H RESTART CHOKED BRANCH ,I5,24H FLOW RATE INC	NPLENMP 3248
	1CREASED TO ,F10.4,6H FROM ,F10.4,7H *****)	NPLENMP 3249
	GO TO 177	NPLENMP 3250
113	BETA1=PIN(ISLICE)**2	NPLENMP 3251
C	CALCULATE THE CHOKING FLOW RATE	NPLENMP 3252
	AB=0.0	NPLENMP 3253
	DO 115 J=1,NSTNS	NPLENMP 3254
	IF (AMC(J).LT.AB) GO TO 115	NPLENMP 3255
	AB=AMC(J)	NPLENMP 3256
115	CONTINUE	NPLENMP 3257
	AJ=(GAM+1.0)/2.0	NPLENMP 3258
	CX=-(GAM+1.0)/(GAM-1.0)/2.0	NPLENMP 3259
	AZ=.95/AB*(1.0+C6*.90)**(CX)*(1.0+C6*AB**2)**(-CX)	NPLENMP 3260
C	COMPUTE RESISTANCE EQUATION FOR BALANCE	NPLENMP 3261
	PT1=(1.0+C6*AMC(1)**2)**(C1/2.0)*BETTA(1)	NPLENMP 3262
	IF (C3.NE.0.0) GO TO 117	NPLENMP 3263
	GO TO 119	NPLENMP 3264
117	DR2=ROUT(ISLICE)**2-RIN(ISLICE)**2	NPLENMP 3265
119	PEXTT=PT1*(1.0+C3/T1*DR2)**(C1/2.0)	NPLENMP 3266
121	CONTINUE	NPLENMP 3267
	Z1(ISLICE)=(PEXTT**2-BETTA(NSTNS)**2)/W(ISLICE)**2	NPLENMP 3268
	IF (Z1(ISLICE).GT.0.0) GO TO 129	NPLENMP 3269
	WRITE(6,125) ISLICE,Z1(ISLICE)	NPLENMP 3270
125	FORMAT(///5X,'PASSAGE ',I3,5X,'HAS NEGATIVE OR NO RESISTANCE'	NPLENMP 3271
	Z ,F12.4//)	NPLENMP 3272
	Z1(ISLICE)=ZED	NPLENMP 3273
129	CONTINUE	NPLENMP 3274
	PP = BETTA(NSTNS)*(1.+C6*AMC(NSTNS)**2)**(C1/2.0)	NPLENMP 3275
	PTEXT = PP	NPLENMP 3276
	DIFTOL=0.005	NPLENMP 3277
	KTR1=0	NPLENMP 3278
C		NPLENMP 3279
C	COMPUTE AVERAGE STATIC PRESSURE AND STATIC TEMPERATURE	NPLENMP 3280
C		NPLENMP 3281
	PXX = 0.0	NPLENMP 3282
	TXX = 0.0	NPLENMP 3283
	DO 134 I = 1,NSTNS	NPLENMP 3284
	TXX = TXX + B(I)	NPLENMP 3285
134	PXX = PXX + BETTA(I)	NPLENMP 3286
	TXX = TXX/XXN - 460.	NPLENMP 3287
	PXX = PXX/XXN	NPLENMP 3288
	TTEXT = TT1(NSTNS)	NPLENMP 3289
	RETURN	NPLENMP 3290
C		NPLENMP 3291
C	COMPUTE ACCELERATION	NPLENMP 3292
C		NPLENMP 3293
135	D=SV(2)-SV(1)	NPLENMP 3294
137	D=(SV(3)-SV(2))/D	NPLENMP 3295
	E=ABS(D)-1.0	NPLENMP 3296
	IF (ABS(D).GT..6) GO TO 143	NPLENMP 3297
139	E=D/(D-1.0)	NPLENMP 3298
141	SIGB=E*SV(2)+(1.0-E)*SV(3)	NPLENMP 3299
143	IS=0	NPLENMP 3300

145	SIGC=SIGB	NPLENMP 3301
	IF (SIGC.LE.0.) GO TO 159	NPLENMP 3302
147	KSIG=KSIG+1	NPLENMP 3303
	IF (KSIG.LT.50) GO TO 155	NPLENMP 3304
149	WRITE (6,151) ISLICE,J	NPLENMP 3305
151	FORMAT(7X,28HPROGRAM IS LOOPING IN BRANCH,I6,9H STATION,I4//)	NPLENMP 3306
	KSIG=0	NPLENMP 3307
	NCC=NCC+1	NPLENMP 3308
	IF (NCC.LT.4) GO TO 159	NPLENMP 3309
153	ISLICE=220	NPLENMP 3310
	GO TO 129	NPLENMP 3311
155	CONTINUE	NPLENMP 3312
	IF (NAG.LT.0) GO TO 45	NPLENMP 3313
157	STOP	NPLENMP 3314
C		NPLENMP 3315
C	CHOKING ADJUSTMENT	NPLENMP 3316
C		NPLENMP 3317
159	WCHOKE=W(ISLICE)	NPLENMP 3318
	DIFTOL=0.050	NPLENMP 3319
161	IF (CH(ISLICE).EQ.0.) GO TO 165	NPLENMP 3320
163	W(ISLICE)=.98*W(ISLICE)	NPLENMP 3321
	IF (KTR1.GT.20) W(ISLICE)=W(ISLICE)*.98**(KTR1-20)	NPLENMP 3322
	GO TO 171	NPLENMP 3323
165	AB=0.	NPLENMP 3324
	IF (J.EQ.1) GO TO 169	NPLENMP 3325
	DO 167 IJK=1,J	NPLENMP 3326
	IF (AMC(IJK).GT.1.0) AMC(IJK)=1.0	NPLENMP 3327
	IF (AMC(IJK).LT.AB) GO TO 167	NPLENMP 3328
	AB=AMC(IJK)	NPLENMP 3329
167	CONTINUE	NPLENMP 3330
	AJ=(GAM+1.)/2.	NPLENMP 3331
	CX=-(GAM+1.00)/(GAM-1.0)/2.0	NPLENMP 3332
	AZ=.95/AB*(1.0+C6*.90)**(CX)*(1.0+C6*AB**2)**(-CX)	NPLENMP 3333
	W(ISLICE)=AZ*W(ISLICE)	NPLENMP 3334
	GO TO 171	NPLENMP 3335
169	CONTINUE	NPLENMP 3336
	W(ISLICE)=1600.0*APLN(ISLICE)*SQRT((32.17*BETA1*GAM)/(R*T1))	NPLENMP 3337
171	CH(ISLICE)=1.0	NPLENMP 3338
173	WRITE(6,175) ISLICE,J,W(ISLICE),WCHOKE	NPLENMP 3339
175	FORMAT(3X,12H*** PASSAGE ,I5,23H HAS CHOKED AT STATION ,I5,	NPLENMP 3340
	134H AND THE FLOW HAS BEEN REDUCED TO ,F10.4,6H FROM ,F10.4,4H ***)	NPLENMP 3341
177	IS=0	NPLENMP 3342
	BETTA(1)=PIN(ISLICE)**2	NPLENMP 3343
	B(1)=T1	NPLENMP 3344
	DX=DXTEMP	NPLENMP 3345
	J=1	NPLENMP 3346
	SIGB=0.0	NPLENMP 3347
	KTR1=KTR1+1	NPLENMP 3348
	IF (KTR1.GE.50) GO TO 181	NPLENMP 3349
179	GO TO 17	NPLENMP 3350
181	WRITE (6,183) ISLICE	NPLENMP 3351
183	FORMAT(/2X,16H**FLOW IN BRANCH,I6,	NPLENMP 3352
	Z ' HAS BEEN REDUCED 50 TIMES BECAUSE OF CHOKING')	NPLENMP 3353
	GO TO 153	NPLENMP 3354
	END	NPLENMP 3355
C	----	
C	SOURCE.NPLOTIT	NPLOTIT 3356
	SUBROUTINE PLOTMF(ALPH2)	NPLOTIT 3357
C		NPLOTIT 3358
C	SOURCE.NPLOTIT	NPLOTIT 3359
C		NPLOTIT 3360

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COMMON /PRPS/ CPO, GAMO, DP(80), SP(80), RE(80), NPLOTIT 3361
Z CPC(80), GAMC(80), DUMR1(80), DUMR2(80) NPL0TIT 3362
NPL0TIT 3363
COMMON /SPECL/ CHANL(8000), TITLE(30), INDCHN(2000), NPL0TIT 3364
Z IPLOT, MD1, MD2, MD3, IADJIN, IWRITE NPL0TIT 3365
NPL0TIT 3366
COMMON /ICO/ ADUMP, ETA, CD, CP, NPL0TIT 3367
Z GAM, PIM, R, SPAN, T0G, NPL0TIT 3368
Z WDUMP, WIM, AKC(15,80), AKW(15,80), NPL0TIT 3369
Z A(400), AJET(80), AM2(80), CNUM(80), NPL0TIT 3370
Z DH(80), DHF(80), DHJ(80), NPL0TIT 3371
Z DLX(400), FF(80), HC(80), HG(80), NPL0TIT 3372
Z P(2,15,80), PEXIT(15), PUMP(80), QG(80), NPL0TIT 3373
Z QSNK(80), RR(80), S(15), T(2,15,400), NPL0TIT 3374
Z IG(80), TAU(400), WFC(80), NPL0TIT 3375
Z WJ(15,80), WCROS(2,15,80), XN(80), NPL0TIT 3376
Z ICOR, IFILM, IHUB, ITIP, NPL0TIT 3377
Z ISBLOK, ISLICE, NBLKSZ, NSLICE, NPL0TIT 3378
Z NFWO, NSTA, IHC(80) NPL0TIT 3379
NPL0TIT 3380
COMMON /IRNSNT/ RHOC, RHOM, SPHTC, SPHTM, NPL0TIT 3381
Z DLTyme, TYME, TEPS, TYMMAX NPL0TIT 3382
NPL0TIT 3383
COMMON /UNITS/ CINCH(2), CHTC(2), CHFLX(2), CPRSR(2), CMSFL(2), NPL0TIT 3384
Z CTMPF(2), CTCON(2), CDEN(2), CSPHT(2), CGASC(2), NPL0TIT 3385
Z CVISC(2), CRHOVG(2), IUNITS NPL0TIT 3386
NPL0TIT 3387
DIMENSION Y(320), XLABL(29), YLABL(7), TLABL1(21), TLABL2(9) NPL0TIT 3388
DIMENSION XLABL2(15), VARIB(15), YPLABL(10), ALPH2(4), ALABL(7) NPL0TIT 3389
DIMENSION XS(80), XP(80), TSO(500), TSM(500), TPO(500), TPM(500) NPL0TIT 3390
DIMENSION YLABL2(11) NPL0TIT 3391
DIMENSION PLEGN(5), SLEGN(5), SYMBL(10), YLBL(20), XLBL(20) NPL0TIT 3392
DIMENSION YTEM(80), ISYM(5), PLTYME(2) NPL0TIT 3393
LOGICAL*1 IXAX/.TRUE./, IYAX/.FALSE./ NPL0TIT 3394
INTEGER*2 NPTS NPL0TIT 3395
DIMENSION RTNARR(2), VARS(12), IVARS(12) NPL0TIT 3396
DATA PLEGN/'A', 'PRES', 'SURE', 'SID', 'E' '/' NPL0TIT 3397
DATA SLEGN/'B', 'SUCTION', 'SID', 'E' '/' NPL0TIT 3398
DATA XLABL2/15*' '/' NPL0TIT 3399
DATA SYMBOL/'0'/' NPL0TIT 3400
DATA XLABL/'MID-', 'WALL', 'X/L', 'PRO', 'M ST', 'ATIO', 'N NO', '1', NPL0TIT 3401
Z 'L =', 'INC', 'HES' NPL0TIT 3402
Z 'SID', 'E', 'C', 'HNL', 'PL', 'ENUM', 'PRE' NPL0TIT 3403
Z 'SS.', 'PSI', 'A***'/' NPL0TIT 3404
DATA YLABL/'----', 'TEMP', 'ERAT', 'URE', 'DEG', 'F.', '----'/' NPL0TIT 3405
DATA YPLABL/'CO', 'OLAN', 'T CH', 'ANNE', 'L T', 'OTAL', 'PRE' NPL0TIT 3406
Z 'SSUR', 'E', 'PSIA'/' NPL0TIT 3407
DATA YLABL2/7*' 'TEMP', 'ERAT', 'URE', 'F' '/' NPL0TIT 3408
DATA TLABL1/21*' '/' NPL0TIT 3409
DATA TLABL2/9*' '/' NPL0TIT 3410
DATA VARIB/'PRES', 'SURE', 'SUC', 'TION', 'SURF', 'ACE', 'MID-', NPL0TIT 3411
Z 'WALL', 'CM', 'KPA', '*****', 'K', 'KP', 'A' '/' NPL0TIT 3412
DATA ALABL/2*' '----', '2*' '----'/' NPL0TIT 3413
DATA SYMBL/'1', '2', '3', '4', '5', '6', '7', '8', '9', '0'/' NPL0TIT 3414
DATA ISYM/62,119,118,70,65/ NPL0TIT 3415
DATA PLTYME/2*' '/' NPL0TIT 3416
ATYME = TYME NPL0TIT 3417
IF (ATYME.LT.0.0) ATYME = 0.0 NPL0TIT 3418
CALL NUMBER(4,ATYME,8,2,PLTYME) NPL0TIT 3419
ALABL(6) = PLTYME(1) NPL0TIT 3420

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ALABL(7) = PLTYME(2)	NPLOTIT 3421
C	NPLOTIT 3422
C MD2 > 0 INDICATES JOB IS COMPLETE.--NOW DO SUMMARY PLOTS.	NPLOTIT 3423
C	NPLOTIT 3424
10 CONTINUE	NPLOTIT 3425
IF (MD2.GT.0) GO TO 80	NPLOTIT 3426
20 NSTAPS = NSTA/2 + 1	NPLOTIT 3427
NLBLS = NSTAPS/5	NPLOTIT 3428
C	NPLOTIT 3429
C SET UP TIME AND DATE LABEL FOR PLOT IDENTIFICATION	NPLOTIT 3430
C	NPLOTIT 3431
ALABL(1) = ALPH2(3)	NPLOTIT 3432
ALABL(2) = ALPH2(4)	NPLOTIT 3433
ALABL(3) = ALPH2(1)	NPLOTIT 3434
ALABL(4) = ALPH2(2)	NPLOTIT 3435
C	NPLOTIT 3436
C SET UP TITLE	NPLOTIT 3437
C	NPLOTIT 3438
DO 45 I = 1,30	NPLOTIT 3439
IF (I.LE.21) TLABL1(I) = TITLE(I)	NPLOTIT 3440
IF (I.GT.21) TLABL2(I-21) = TITLE(I)	NPLOTIT 3441
45 CONTINUE	NPLOTIT 3442
C	NPLOTIT 3443
C PRESSURE SIDE	NPLOTIT 3444
C	NPLOTIT 3445
46 IF (MD3.GT.1) GO TO 55	NPLOTIT 3446
47 XP(1) = 0.0	NPLOTIT 3447
IX = 1	NPLOTIT 3448
DO 50 I = 3,NSTA,2	NPLOTIT 3449
C	NPLOTIT 3450
C NMM IS THE MIDMETAL NODE NUMBER (L)	NPLOTIT 3451
C	NPLOTIT 3452
NMM = 5*I - 2	NPLOTIT 3453
IX = IX + 1	NPLOTIT 3454
50 XP(IX) = XP(IX-1) + DLX(NMM)/CINCH(IUNITS)	NPLOTIT 3455
XPL = XP(NSTAPS)	NPLOTIT 3456
DO 51 I = 2,NSTAPS	NPLOTIT 3457
51 XP(I) = XP(I)/XPL	NPLOTIT 3458
55 CONTINUE	NPLOTIT 3459
IY = 0	NPLOTIT 3460
ITP = NSTAPS*(ISLICE-1)	NPLOTIT 3461
DO 60 I = 1,NSTA,2	NPLOTIT 3462
IY = IY + 1	NPLOTIT 3463
NOS = 5*I - 4	NPLOTIT 3464
Y(IY) = T(2,ISLICE,NOS)/CTMPF(IUNITS)	NPLOTIT 3465
IF (IUNITS.EQ.2) Y(IY) = Y(IY) - 460.	NPLOTIT 3466
ITP = ITP + 1	NPLOTIT 3467
TPO(ITP) = Y(IY)	NPLOTIT 3468
IYP = IY + NSTAPS	NPLOTIT 3469
Y(IYP) = T(2,ISLICE,NOS+1)/CTMPF(IUNITS)	NPLOTIT 3470
IF (IUNITS.EQ.2) Y(IYP) = Y(IYP) - 460.	NPLOTIT 3471
IYP = IY + 2*NSTAPS	NPLOTIT 3472
Y(IYP) = T(2,ISLICE,NOS+2)/CTMPF(IUNITS)	NPLOTIT 3473
IF (IUNITS.EQ.2) Y(IYP) = Y(IYP) - 460.	NPLOTIT 3474
TPM(ITP) = Y(IYP)	NPLOTIT 3475
IYP = IY + 3*NSTAPS	NPLOTIT 3476
Y(IYP) = T(2,ISLICE,NOS+3)/CTMPF(IUNITS)	NPLOTIT 3477
IF (IUNITS.EQ.2) Y(IYP) = Y(IYP) - 460.	NPLOTIT 3478
IYP = IY + 4*NSTAPS	NPLOTIT 3479
NCOOL = NOS + 4	NPLOTIT 3480

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60      Y(IYP) = T(2,ISLICE,NCOOL)/CTMPF(IUNITS)
      IF (IUNITS.EQ.2) Y(IYP) = Y(IYP) - 460.
      XLABL(16) = VARIB(1)
      XLABL(17) = VARIB(2)
      IF (IUNITS.EQ.2) GO TO 601
      XLABL(12) = VARIB(9)
      XLABL(13) = VARIB(10)
      XLABL(28) = VARIB(11)
      XLABL(29) = VARIB(12)
      YLABL(5) = VARIB(13)
      YLABL(6) = VARIB(10)
      YPLABL(10) = VARIB(11)
      YLABL2(11) = VARIB(13)
601    CONTINUE
      DO 611 I = 1,15
611    XLABL2(I) = XLABL(I+15)
C
      IF (IPLLOT.EQ.3) GO TO 63
C
      CPIM = PIM/CPRSR(IUNITS)
      CALL NUMBER(1,ISLICE,4,0,XLABL2(6))
      CALL NUMBER(4,CPIM,8,1,XLABL2(11))
      CALL NUMBER(4,XPL,8,4,XLABL(10))
      CALL CHARS(84,TLABL1,0.0,0.15,9.85,12)
      CALL CHARS(36,TLABL2,0.0,0.15,9.65,12)
      CALL CHARS(60,XLABL,0.0,1.5,.25,12)
      CALL CHARS(56,XLABL2,0.0,1.5,.05,12)
      CALL CHARS(28,YLABL,90.,.25,3.3,12)
      MD3 = MD3 + 1
      CALL NUMEER(1,MD3,4,0,ALABL(5))
      CALL CHARS(28,ALABL,0.0,6.2,9.3,12)
C
C--- TITLES ARE DONE, NOW SET UP AXES FOR TEMPERATURE PLOTS
C
      NPTS = NSTAPS
      CALL SCALE(IXAX,NPTS,XP)
      NPTS = 5*NSTAPS
      CALL SCLBAK(IYAX,NPTS,Y,RTNAFR)
      CALL GINTVL(RTNARR(1),RTNARR(2),10,1,YMIN,YMAX)
      VARS(1) = 7.0
      VARS(2) = 9.0
      VARS(3) = 0.0
      VARS(4) = 0.0
      VARS(5) = 1.0
      VARS(6) = .5
      VARS(7) = 1.0
      CALL XAXIS(.8,.6,VARS)
      VARS(2) = 8.9
      VARS(3) = 90.
      VARS(4) = YMIN
      VARS(5) = YMAX
      CALL YAXIS(.8,.6,VARS)
C
C--- AXES ARE SET. NOW PLOT THE FIVE TEMPERATURE CURVES, USING
C      DIFFERENT SYMBOLS FOR EACH.
C
      IVARS(1) = 4
      IVARS(2) = NSTAPS
      IVARS(3) = 2
      DO 603 I = 1,5

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NPLTOTIT 3481
NPLTOTIT 3482
NPLTOTIT 3483
NPLTOTIT 3484
NPLTOTIT 3485
NPLTOTIT 3486
NPLTOTIT 3487
NPLTOTIT 3488
NPLTOTIT 3489
NPLTOTIT 3490
NPLTOTIT 3491
NPLTOTIT 3492
NPLTOTIT 3493
NPLTOTIT 3494
NPLTOTIT 3495
NPLTOTIT 3496
NPLTOTIT 3497
NPLTOTIT 3498
NPLTOTIT 3499
NPLTOTIT 3500
NPLTOTIT 3501
NPLTOTIT 3502
NPLTOTIT 3503
NPLTOTIT 3504
NPLTOTIT 3505
NPLTOTIT 3506
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NPLTOTIT 3528
NPLTOTIT 3529
NPLTOTIT 3530
NPLTOTIT 3531
NPLTOTIT 3532
NPLTOTIT 3533
NPLTOTIT 3534
NPLTOTIT 3535
NPLTOTIT 3536
NPLTOTIT 3537
NPLTOTIT 3538
NPLTOTIT 3539
NPLTOTIT 3540

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	IVARS(4) = ISYM(I)	NPLOTIT 3541
	IYST = 1 + (I-1)*NSTAPS	NPLOTIT 3542
	IYEN = I*NSTAPS	NPLOTIT 3543
	III = 0	NPLOTIT 3544
	DO 602 II = IYST,IYEN	NPLOTIT 3545
	III = III + 1	NPLOTIT 3546
602	YTEM(III) = Y(II)	NPLOTIT 3547
	CALL GPLOT(XP,YTEM,IVARS)	NPLOTIT 3548
603	CONTINUE	NPLOTIT 3549
	CALL DISPLA(1)	NPLOTIT 3550
C		NPLOTIT 3551
C		NPLOTIT 3552
C	PRESSURE SIDE COOLANT PRESSURE DISTRIBUTION	NPLOTIT 3553
C		NPLOTIT 3554
	IY = 0	NPLOTIT 3555
	DO 61 I = 1,NSTA,2	NPLOTIT 3556
	IY = IY + 1	NPLOTIT 3557
61	Y(IY) = P(2,ISLICE,I)*	NPLOTIT 3558
	Z (1.+(GAMC(I)-1.)*AM2(I)/2.)**(GAMC(I)/(GAMC(I)-1.))/CPRSR(IUNITS)	NPLOTIT 3559
	CALL CHARS(84,TLABL1,0.0,0.15,9.85,12)	NPLOTIT 3560
	CALL CHARS(36,TLABL2,0.0,0.15,9.65,12)	NPLOTIT 3561
	CALL CHARS(60,XLABL,0.0,1.5,.25,12)	NPLOTIT 3562
	CALL CHARS(56,XLABL2,0.0,1.5,.05,12)	NPLOTIT 3563
	CALL CHARS(40,YPLABL,90.,.25,2.8,12)	NPLOTIT 3564
	MD3 = MD3 + 1	NPLOTIT 3565
	CALL NUMBER(1,MD3,4,0,ALABL(5))	NPLOTIT 3566
	CALL CHARS(28,ALABL,C.0,6.2,9.3,12)	NPLOTIT 3567
	NPTS = NSTAPS	NPLOTIT 3568
	CALL SCALE(IXAX,NPTS,XP)	NPLOTIT 3569
	CALL SCLBAK(IYAX,NPTS,Y,RTNARR)	NPLOTIT 3570
	CALL GINTVL(RTNARR(1),RTNARR(2),10,1,YMIN,YMAX)	NPLOTIT 3571
	VARS(1) = 7.0	NPLOTIT 3572
	VARS(2) = 9.0	NPLOTIT 3573
	VARS(3) = 0.0	NPLOTIT 3574
	VARS(4) = 0.0	NPLOTIT 3575
	VARS(5) = 1.0	NPLOTIT 3576
	VARS(6) = .5	NPLOTIT 3577
	VARS(7) = 1.0	NPLOTIT 3578
	CALL XAXIS(.8,.6,VARS)	NPLOTIT 3579
	VARS(2) = 8.9	NPLOTIT 3580
	VARS(3) = 90.	NPLOTIT 3581
	VARS(4) = YMIN	NPLOTIT 3582
	VARS(5) = YMAX	NPLOTIT 3583
	CALL YAXIS(.8,.6,VARS)	NPLOTIT 3584
C		NPLOTIT 3585
C---	AXES ARE SET, NOW PLOT THE PRESSURE	NPLOTIT 3586
C		NPLOTIT 3587
	IVARS(1) = 4	NPLOTIT 3588
	IVARS(2) = NSTAPS	NPLOTIT 3589
	IVARS(3) = 2	NPLOTIT 3590
	IVARS(4) = 65	NPLOTIT 3591
	CALL GPLOT(XP,Y,IVARS)	NPLOTIT 3592
	CALL DISPLA(1)	NPLOTIT 3593
C		NPLOTIT 3594
C	SUCTION SIDE	NPLOTIT 3595
C		NPLOTIT 3596
	IF (MD3.GT.2) GO TO 69	NPLOTIT 3597
63	XS(1) = 0.0	NPLOTIT 3598
	IX = 1	NPLOTIT 3599
	DO 65 I = 2,NSTA,2	NPLOTIT 3600


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NMM = 5*I - 2
IX = IX + 1
65 XS(IX) = XS(IX-1) + DLX(NMM)/CINCH(IUNITS)
XSL = XS(NSTAPS)
DO 66 I = 2,NSTAPS
66 XS(I) = XS(I)/XSL
69 CONTINUE
C

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```

IY = 1
ITS = NSTAPS*(ISLICE-1) + 1
Y(IY) = T(2,ISLICE,1)/CTMPF(IUNITS)
IF (IUNITS.EQ.2) Y(IY) = Y(IY) - 460.
TSO(ITS) = Y(IY)
IYP = IY + NSTAPS
Y(IYP) = T(2,ISLICE,2)/CTMPF(IUNITS)
IF (IUNITS.EQ.2) Y(IYP) = Y(IYP) - 460.
IYP = IYP + NSTAPS
Y(IYP) = T(2,ISLICE,3)/CTMPF(IUNITS)
IF (IUNITS.EQ.2) Y(IYP) = Y(IYP) - 460.
TSM(ITS) = Y(IYP)
IYP = IYP + NSTAPS
Y(IYP) = T(2,ISLICE,4)/CTMPF(IUNITS)
IF (IUNITS.EQ.2) Y(IYP) = Y(IYP) - 460.
IYP = IYP + NSTAPS
Y(IYP) = T(2,ISLICE,5)/CTMPF(IUNITS)
IF (IUNITS.EQ.2) Y(IYP) = Y(IYP) - 460.
DO 70 I = 2,NSTA,2
IY = IY + 1
NOS = 5*I - 4
Y(IY) = T(2,ISLICE,NOS)/CTMPF(IUNITS)
IF (IUNITS.EQ.2) Y(IY) = Y(IY) - 460.
ITS = ITS + 1
TSO(ITS) = Y(IY)
IYP = IY + NSTAPS
Y(IYP) = T(2,ISLICE,NOS+1)/CTMPF(IUNITS)
IF (IUNITS.EQ.2) Y(IYP) = Y(IYP) - 460.
IYP = IYP + NSTAPS
Y(IYP) = T(2,ISLICE,NOS+2)/CTMPF(IUNITS)
IF (IUNITS.EQ.2) Y(IYP) = Y(IYP) - 460.
TSM(ITS) = Y(IYP)
IYP = IYP + NSTAPS
Y(IYP) = T(2,ISLICE,NOS+3)/CTMPF(IUNITS)
IF (IUNITS.EQ.2) Y(IYP) = Y(IYP) - 460.
IYP = IYP + NSTAPS
NCOOL = NOS + 4
Y(IYP) = T(2,ISLICE,NCOOL)/CTMPF(IUNITS)
70 IF (IUNITS.EQ.2) Y(IYP) = Y(IYP) - 460.
XLABL2(1) = VARIB(3)
XLABL2(2) = VARIB(4)
C

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IF (IPLT.EQ.3) GO TO 80
C

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CALL NUMBER(1,ISLICE,4,0,XLABL2(6))
CALL NUMBER(4,CPIM,8,1,XLABL2(11))
CALL NUMBER(4,XSL,8,4,XLABL(10))
IX = 2 + NFWD/2
CALL CHARS(84,TLABL1,0.0,0.15,9.85,12)
CALL CHARS(36,TLABL2,0.0,0.15,9.65,12)
CALL CHARS(60,XLABL,0.0,1.5,.25,12)
CALL CHARS(56,XLABL2,0.0,1.5,.05,12)

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NPLOTIT 3601
NPLOTIT 3602
NPLOTIT 3603
NPLOTIT 3604
NPLOTIT 3605
NPLOTIT 3606
NPLOTIT 3607
NPLOTIT 3608
NPLOTIT 3609
NPLOTIT 3610
NPLOTIT 3611
NPLOTIT 3612
NPLOTIT 3613
NPLOTIT 3614
NPLOTIT 3615
NPLOTIT 3616
NPLOTIT 3617
NPLOTIT 3618
NPLOTIT 3619
NPLOTIT 3620
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NPLOTIT 3622
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NPLOTIT 3649
NPLOTIT 3650
NPLOTIT 3651
NPLOTIT 3652
NPLOTIT 3653
NPLOTIT 3654
NPLOTIT 3655
NPLOTIT 3656
NPLOTIT 3657
NPLOTIT 3658
NPLOTIT 3659
NPLOTIT 3660

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CALL CHARS(28,YLABL,90.,.25,3.3,12)	NPLOTIT 3661
MD3 = MD3 + 1	NPLOTIT 3662
CALL NUMBER(1,MD3,4,0,ALABL(5))	NPLOTIT 3663
CALL CHARS(28,ALABL,0.0,6.2,9.3,12)	NPLOTIT 3664
C	NPLOTIT 3665
C--- TITLES ARE DONE, NOW SET UP AXES FOR TEMPERATURE PLOTS	NPLOTIT 3666
C	NPLOTIT 3667
NPTS = NSTAPS	NPLOTIT 3668
CALL SCALE(IXAX,NPTS,XS)	NPLOTIT 3669
NPTS = 5*NSTAPS	NPLOTIT 3670
CALL SCLBAK(IYAX,NPTS,Y,RTNARR)	NPLOTIT 3671
CALL GINTVL(RTNARR(1),RTNARR(2),10,1,YMIN,YMAX)	NPLOTIT 3672
VARS(1) = 7.0	NPLOTIT 3673
VARS(2) = 9.0	NPLOTIT 3674
VARS(3) = 0.0	NPLOTIT 3675
VARS(4) = 0.0	NPLOTIT 3676
VARS(5) = 1.0	NPLOTIT 3677
VARS(6) = .5	NPLOTIT 3678
VARS(7) = 1.0	NPLOTIT 3679
CALL XAXIS(.8,.6,VARS)	NPLOTIT 3680
VARS(2) = 8.9	NPLOTIT 3681
VARS(3) = 90.	NPLOTIT 3682
VARS(4) = YMIN	NPLOTIT 3683
VARS(5) = YMAX	NPLOTIT 3684
CALL YAXIS(.8,.6,VARS)	NPLOTIT 3685
C	NPLOTIT 3686
C--- AXES ARE SET. NOW PLOT THE FIVE TEMPERATURE CURVES, USING	NPLOTIT 3687
C DIFFERENT SYMBOLS FOR EACH.	NPLOTIT 3688
C	NPLOTIT 3689
IVARS(1) = 4	NPLOTIT 3690
IVARS(2) = NSTAPS	NPLOTIT 3691
IVARS(3) = 2	NPLOTIT 3692
DO 703 I = 1,5	NPLOTIT 3693
IVARS(4) = ISYM(I)	NPLOTIT 3694
IYST = 1 + (I-1)*NSTAPS	NPLOTIT 3695
IYEN = I*NSTAPS	NPLOTIT 3696
III = 0	NPLOTIT 3697
DO 702 II = IYST,IYEN	NPLOTIT 3698
III = III + 1	NPLOTIT 3699
702 YTEM(III) = Y(II)	NPLOTIT 3700
CALL GPLOT(XS,YTEM,IVARS)	NPLOTIT 3701
703 CONTINUE	NPLOTIT 3702
CALL DISPLA(1)	NPLOTIT 3703
C	NPLOTIT 3704
C	NPLOTIT 3705
C SUCTION SIDE COOLANT PRESSURE DISTRIBUTION	NPLOTIT 3706
C	NPLOTIT 3707
Y(1) = P(2,ISLICE,1)*	NPLOTIT 3708
Z (1.+(GAMC(1)-1.)*AM2(1)/2.)**(GAMC(1)/(GAMC(1)-1.))/CPRSR(IUNITS)	NPLOTIT 3709
IY = 1	NPLOTIT 3710
DO 75 I = 2,NSTA,2	NPLOTIT 3711
IY = IY + 1	NPLOTIT 3712
75 Y(IY) = P(2,ISLICE,I)*(1.+(GAMC(I)-1.)*	NPLOTIT 3713
Z *AM2(I)/2.)**(GAMC(I)/(GAMC(I)-1.))/CPRSR(IUNITS)	NPLOTIT 3714
CALL CHARS(84,TLABL1,0.0,0.15,9.85,12)	NPLOTIT 3715
CALL CHARS(36,TLABL2,0.0,0.15,9.65,12)	NPLOTIT 3716
CALL CHARS(60,XLABL,0.0,1.5,.25,12)	NPLOTIT 3717
CALL CHARS(56,XLABL2,0.0,1.5,.05,12)	NPLOTIT 3718
CALL CHARS(40,YPLABL,90.,.25,2.8,12)	NPLOTIT 3719
MD3 = MD3 + 1	NPLOTIT 3720

CALL NUMBER(1,MD3,4,0,ALABL(5))	NPLOTIT 3721
CALL CHARS(28,ALABL,0.0,6.2,9.3,12)	NPLOTIT 3722
NPTS = NSTAPS	NPLOTIT 3723
CALL SCALE(IXAX,NPTS,XS)	NPLOTIT 3724
CALL SCLBAK(IYAX,NPTS,Y,RTNARR)	NPLOTIT 3725
CALL GINTVL(RTNARR(1),RTNARR(2),10,1,YMIN,YMAX)	NPLOTIT 3726
VARS(1) = 7.0	NPLOTIT 3727
VARS(2) = 9.0	NPLOTIT 3728
VARS(3) = 0.0	NPLOTIT 3729
VARS(4) = 0.0	NPLOTIT 3730
VARS(5) = 1.0	NPLOTIT 3731
VARS(6) = .5	NPLOTIT 3732
VARS(7) = 1.0	NPLOTIT 3733
CALL XAXIS(.8,.6,VARS)	NPLOTIT 3734
VARS(2) = 8.9	NPLOTIT 3735
VARS(3) = 90.	NPLOTIT 3736
VARS(4) = YMIN	NPLOTIT 3737
VARS(5) = YMAX	NPLOTIT 3738
CALL YAXIS(.8,.6,VARS)	NPLOTIT 3739
C	NPLOTIT 3740
C--- AXES ARE SET, NOW PLOT THE PRESSURE	NPLOTIT 3741
C	NPLOTIT 3742
IVARS(1) = 4	NPLOTIT 3743
IVARS(2) = NSTAPS	NPLOTIT 3744
IVARS(3) = 2	NPLOTIT 3745
IVARS(4) = 65	NPLOTIT 3746
CALL GPLOT(XS,Y,IVARS)	NPLOTIT 3747
CALL DISPLA(1)	NPLOTIT 3748
GO TO 150	NPLOTIT 3749
C	NPLOTIT 3750
C THE FOLLOWING SECTION PUTS OUT PLOTS CONTAINING TEMPERATURES FROM	NPLOTIT 3751
C ALL SLICES ON ONE FRAME	NPLOTIT 3752
C	NPLOTIT 3753
80 CONTINUE	NPLOTIT 3754
IF (ISLICE.LT.NSLICE) GO TO 150	NPLOTIT 3755
C	NPLOTIT 3756
C THE FOLLOWING PUTS TWO PLOTS ON ONE FRAME OF FILM	NPLOTIT 3757
C	NPLOTIT 3758
C FIRST PLOT THE OUTSIDE SURFACE TEMPERATURES FOR EACH	NPLOTIT 3759
C SLICE ON THE SAME PLOT	NPLOTIT 3760
C	NPLOTIT 3761
NPTS = NSTAPS*NSLICE	NPLOTIT 3762
CALL SCLBAK(IYAX,NPTS,TPC,RTNARR)	NPLOTIT 3763
TMAXP = RTNARR(2)	NPLOTIT 3764
TMINP = RTNARR(1)	NPLOTIT 3765
CALL SCLBAK(IYAX,NPTS,TSO,RTNARR)	NPLOTIT 3766
TMAXS = RTNARR(2)	NPLOTIT 3767
TMINS = RTNARR(1)	NPLOTIT 3768
IF (TMAXS.GT.TMAXP) TMAXP = TMAXS	NPLOTIT 3769
IF (TMINS.LT.TMINP) TMINP = TMINS	NPLOTIT 3770
NINTRV = (TMAXP-TMINP)/100. + 2	NPLOTIT 3771
CALL GINTVL(TMINP,TMAXP,NINTRV,0,ATMINP,ATMAXP)	NPLOTIT 3772
AINTRV = NINTRV	NPLOTIT 3773
CALL CHARS(84,TLABL1,0.0,0.15,9.85,12)	NPLOTIT 3774
CALL CHARS(36,TLABL2,0.0,0.15,9.65,12)	NPLOTIT 3775
YLABL2(5) = VARIB(5)	NPLOTIT 3776
YLABL2(6) = VARIB(6)	NPLOTIT 3777
CALL CHARS(44,YLABL2,90.,.25,1.6,12)	NPLOTIT 3778
VARS(1) = 8.	NPLOTIT 3779
VARS(2) = 8.5	NPLOTIT 3780

VAR(3) = 0.	NPLOTIT 3781
VAR(4) = 0.0	NPLOTIT 3782
VAR(5) = 1.0	NPLOTIT 3783
VAR(6) = .5	NPLOTIT 3784
VAR(7) = 1.0	NPLOTIT 3785
VAR(8) = 0.0	NPLOTIT 3786
CALL XAXIS(1.2,5.5,VAR)	NPLOTIT 3787
MD3 = MD3 + 1	NPLOTIT 3788
CALL NUMBER(1,MD3,4,0,ALAB(5))	NPLOTIT 3789
CALL CHARS(28,ALAB,0.0,1.3,9.5,12)	NPLOTIT 3790
CALL CHARS(20,PLEGN,0.0,6.0,9.5,12)	NPLOTIT 3791
VAR(1) = 7.	NPLOTIT 3792
VAR(2) = 3.8	NPLOTIT 3793
VAR(3) = 90.	NPLOTIT 3794
VAR(4) = ATMINP	NPLOTIT 3795
VAR(5) = ATMAXP	NPLOTIT 3796
VAR(6) = AINTRV	NPLOTIT 3797
VAR(7) = 1.	NPLOTIT 3798
CALL YAXIS(1.2,5.5,VAR)	NPLOTIT 3799
DO 100 I = 1,NSLICE	NPLOTIT 3800
JST = NSTAPS*(I-1)	NPLOTIT 3801
DO 95 J = 1,NSTAPS	NPLOTIT 3802
95 Y(J) = TPO(JST+J)	NPLOTIT 3803
SYMBOL = SYMBL(I)	NPLOTIT 3804
KS = 0	NPLOTIT 3805
C	NPLOTIT 3806
C--- LABEL EVERY 10TH POINT WITH THE SLICE NUMBER, TO	NPLOTIT 3807
C IDENTIFY THE CURVES.	NPLOTIT 3808
KSTART = I + 1	NPLOTIT 3809
DO 98 K = KSTART,NSTAPS,10	NPLOTIT 3810
KS = KS + 1	NPLOTIT 3811
98 XLBL(KS) = XP(K)	NPLOTIT 3812
YLBL(KS) = Y(K)	NPLOTIT 3813
IVAR(1) = 6	NPLOTIT 3814
IVAR(2) = NLBLS	NPLOTIT 3815
IVAR(3) = 3	NPLOTIT 3816
IVAR(4) = 240+I	NPLOTIT 3817
IVAR(5) = 1	NPLOTIT 3818
IVAR(6) = 8	NPLOTIT 3819
CALL GPLOT(XLBL,YLBL,IVAR)	NPLOTIT 3820
IVAR(1) = 3	NPLOTIT 3821
IVAR(2) = NSTAPS	NPLOTIT 3822
IVAR(3) = 0	NPLOTIT 3823
100 CALL GPLOT(XP,Y,IVAR)	NPLOTIT 3824
C	NPLOTIT 3825
C	NPLOTIT 3826
VAR(1) = 7.	NPLOTIT 3827
VAR(2) = 8.5	NPLOTIT 3828
VAR(3) = 0.	NPLOTIT 3829
VAR(4) = 0.0	NPLOTIT 3830
VAR(5) = 1.0	NPLOTIT 3831
VAR(6) = .5	NPLOTIT 3832
VAR(7) = 1.0	NPLOTIT 3833
CALL XAXIS(1.2,.5,VAR)	NPLOTIT 3834
CALL CHARS(42,XLBL,0.0,3.0,.05,12)	NPLOTIT 3835
VAR(1) = 7.	NPLOTIT 3836
VAR(2) = 3.8	NPLOTIT 3837
VAR(3) = 90.	NPLOTIT 3838
VAR(4) = ATMINP	NPLOTIT 3839
VAR(5) = ATMAXP	NPLOTIT 3840

	VARS(6) = AINTRV	NPLOTIT 3841
	VARS(7) = 1.	NPLOTIT 3842
	CALL YAXIS(1.2,.5,VARS)	NPLOTIT 3843
	CALL CHARS(20,SLEGN,0.0,6.0,4.5,12)	NPLOTIT 3844
	DO 110 I = 1,NSLICE	NPLOTIT 3845
	JST = NSTAPS*(I-1)	NPLOTIT 3846
	DO 105 J = 1,NSTAPS	NPLOTIT 3847
105	Y(J) = TSO(JST+J)	NPLOTIT 3848
	SYMBOL = SYMBL(I)	NPLOTIT 3849
	KS = 0	NPLOTIT 3850
C		NPLOTIT 3851
C---	LABEL EVERY 10TH POINT WITH THE SLICE NUMBER, TO	NPLOTIT 3852
C	IDENTIFY THE CURVES.	NPLOTIT 3853
	KSTART = I + 1	NPLOTIT 3854
	DO 108 K = KSTART,NSTAPS,10	NPLOTIT 3855
	KS = KS + 1	NPLOTIT 3856
	XLBL(KS) = XS(K)	NPLOTIT 3857
108	YLBL(KS) = Y(K)	NPLOTIT 3858
	IVARS(1) = 6	NPLOTIT 3859
	IVARS(2) = NLBLS	NPLOTIT 3860
	IVARS(3) = 3	NPLOTIT 3861
	IVARS(4) = 240+I	NPLOTIT 3862
	IVARS(5) = 1	NPLOTIT 3863
	IVARS(6) = 8	NPLOTIT 3864
	CALL GPlot(XLBL,YLBL,IVARS)	NPLOTIT 3865
	IVARS(1) = 3	NPLOTIT 3866
	IVARS(2) = NSTAPS	NPLOTIT 3867
	IVARS(3) = 0	NPLOTIT 3868
110	CALL GPlot(XS,Y,IVARS)	NPLOTIT 3869
	CALL DISPLA(1)	NPLOTIT 3870
C		NPLOTIT 3871
C		NPLOTIT 3872
C		NPLOTIT 3873
C	NOW PLOT THE MID-METAL TEMPERATURES FOR EACH SLICE, ALL ON ONE PLOT	NPLOTIT 3874
C		NPLOTIT 3875
112	CONTINUE	NPLOTIT 3876
	CALL SCLBAK(IYAX,NPTS,TPM,RTNARR)	NPLOTIT 3877
	TMAXP = RTNARR(2)	NPLOTIT 3878
	TMINP = RTNARR(1)	NPLOTIT 3879
	CALL SCLBAK(IYAX,NPTS,TSM,RTNARR)	NPLOTIT 3880
	TMAXS = RTNARR(2)	NPLOTIT 3881
	TMINS = RTNARR(1)	NPLOTIT 3882
	IF (TMAXS.GT.TMAXP) TMAXP = TMAXS	NPLOTIT 3883
	IF (TMINS.LT.TMINP) TMINP = TMINS	NPLOTIT 3884
	NINTRV = (TMAXP-TMINP)/100. + 2	NPLOTIT 3885
	CALL GINTVL(TMINP,TMAXP,NINTRV,0,ATMINP,ATMAXP)	NPLOTIT 3886
	AINTRV = NINTRV	NPLOTIT 3887
	CALL CHARS(84,TLABL1,0.0,0.15,9.85,12)	NPLOTIT 3888
	CALL CHARS(36,TLABL2,0.0,0.15,9.65,12)	NPLOTIT 3889
	YLABL2(5) = VARIB(7)	NPLOTIT 3890
	YLABL2(6) = VARIB(8)	NPLOTIT 3891
	CALL CHARS(44,YLABL2,90.,.25,1.6,12)	NPLOTIT 3892
	VARS(1) = 8.	NPLOTIT 3893
	VARS(2) = 8.5	NPLOTIT 3894
	VARS(3) = 0.	NPLOTIT 3895
	VARS(4) = 0.0	NPLOTIT 3896
	VARS(5) = 1.0	NPLOTIT 3897
	VARS(6) = .5	NPLOTIT 3898
	VARS(7) = 1.0	NPLOTIT 3899
	VARS(8) = 0.0	NPLOTIT 3900

	CALL XAXIS(1.2,5.5,VAR5)	NPLOTIT 3901
	MD3 = MD3 + 1	NPLOTIT 3902
	CALL NUMBER(1,MD3,4,0,ALABL(5))	NPLOTIT 3903
	CALL CHARS(28,ALABL,0.0,1.3,9.5,12)	NPLOTIT 3904
	CALL CHARS(20,PLEGN,0.0,6.0,9.5,12)	NPLOTIT 3905
	VAR5(1) = 7.	NPLOTIT 3906
	VAR5(2) = 3.8	NPLOTIT 3907
	VAR5(3) = 90.	NPLOTIT 3908
	VAR5(4) = ATMINP	NPLOTIT 3909
	VAR5(5) = ATMAXP	NPLOTIT 3910
	VAR5(6) = AINTRV	NPLOTIT 3911
	VAR5(7) = 1.	NPLOTIT 3912
	CALL YAXIS(1.2,5.5,VAR5)	NPLOTIT 3913
114	CONTINUE	NPLOTIT 3914
	DO 120 I = 1,NSLICE	NPLOTIT 3915
	JST = NSTAPS*(I-1)	NPLOTIT 3916
	DO 115 J = 1,NSTAPS	NPLOTIT 3917
115	Y(J) = TPM(JST+J)	NPLOTIT 3918
	SYMBOL = SYMBL(I)	NPLOTIT 3919
	KS = 0	NPLOTIT 3920
C		NPLOTIT 3921
C---	LABEL EVERY 10TH POINT WITH THE SLICE NUMBER, TO	NPLOTIT 3922
C	IDENTIFY THE CURVES.	NPLOTIT 3923
	KSTART = I + 1	NPLOTIT 3924
	DO 118 K = KSTART,NSTAPS,10	NPLOTIT 3925
	KS = KS + 1	NPLOTIT 3926
	XLBL(KS) = XP(K)	NPLOTIT 3927
118	YLBL(KS) = Y(K)	NPLOTIT 3928
	IVARS(1) = 6	NPLOTIT 3929
	IVARS(2) = NLBLS	NPLOTIT 3930
	IVARS(3) = 3	NPLOTIT 3931
	IVARS(4) = 240+I	NPLOTIT 3932
	IVARS(5) = 1	NPLOTIT 3933
	IVARS(6) = 8	NPLOTIT 3934
	CALL GPLOT(XLBL,YLBL,IVARS)	NPLOTIT 3935
	IVARS(1) = 3	NPLOTIT 3936
	IVARS(2) = NSTAPS	NPLOTIT 3937
	IVARS(3) = 0	NPLOTIT 3938
120	CALL GPLOT(XP,Y,IVARS)	NPLOTIT 3939
C		NPLOTIT 3940
C		NPLOTIT 3941
	VAR5(1) = 7.	NPLOTIT 3942
	VAR5(2) = 8.5	NPLOTIT 3943
	VAR5(3) = 0.	NPLOTIT 3944
	VAR5(4) = 0.0	NPLOTIT 3945
	VAR5(5) = 1.0	NPLOTIT 3946
	VAR5(6) = .5	NPLOTIT 3947
	VAR5(7) = 1.0	NPLOTIT 3948
	CALL XAXIS(1.2,.5,VAR5)	NPLOTIT 3949
	CALL CHARS(42,XLABL,0.0,3.5,.05,15)	NPLOTIT 3950
	VAR5(1) = 7.	NPLOTIT 3951
	VAR5(2) = 3.8	NPLOTIT 3952
	VAR5(3) = 90.	NPLOTIT 3953
	VAR5(4) = ATMINP	NPLOTIT 3954
	VAR5(5) = ATMAXP	NPLOTIT 3955
	VAR5(6) = AINTRV	NPLOTIT 3956
	VAR5(7) = 1.	NPLOTIT 3957
	CALL YAXIS(1.2,.5,VAR5)	NPLOTIT 3958
	CALL CHARS(20,SLEGN,0.0,6.0,4.5,12)	NPLOTIT 3959
	DO 130 I = 1,NSLICE	NPLOTIT 3960

	JST = NSTAPS*(I-1)	NPLOTIT 3961
	DO 125 J = 1,NSTAPS	NPLOTIT 3962
125	Y(J) = TSM(JST+J)	NPLOTIT 3963
	SYMBOL = SYMBL(I)	NPLOTIT 3964
	KS = 0	NPLOTIT 3965
C		NPLOTIT 3966
C---	LABEL EVERY 10TH POINT WITH THE SLICE NUMBER, TO	NPLOTIT 3967
C	IDENTIFY THE CURVES.	NPLOTIT 3968
	KSTART = I + 1	NPLOTIT 3969
	DO 128 K = KSTART,NSTAPS,10	NPLOTIT 3970
	KS = KS + 1	NPLOTIT 3971
	XLBL(KS) = XS(K)	NPLOTIT 3972
128	YLBL(KS) = Y(K)	NPLOTIT 3973
	IVARS(1) = 6	NPLOTIT 3974
	IVARS(2) = NLBLS	NPLOTIT 3975
	IVARS(3) = 3	NPLOTIT 3976
	IVARS(4) = 240+I	NPLOTIT 3977
	IVARS(5) = 1	NPLOTIT 3978
	IVARS(6) = 8	NPLOTIT 3979
	CALL GLOT(XLBL,YLBL,IVARS)	NPLOTIT 3980
	IVARS(1) = 3	NPLOTIT 3981
	IVARS(2) = NSTAPS	NPLOTIT 3982
	IVARS(3) = 0	NPLOTIT 3983
130	CALL GLOT(XS,Y,IVARS)	NPLOTIT 3984
	CALL DISPLA(1)	NPLOTIT 3985
C		NPLOTIT 3986
C		NPLOTIT 3987
150	CONTINUE	NPLOTIT 3988
	RETURN	NPLOTIT 3989
	END	NPLOTIT 3990

C----	SOURCE.NPREPAT	NPREPAT 3991
	SUBROUTINE PREP(ICHNL,NTTG)	NPREPAT 3992
C		NPREPAT 3993
C-	SOURCE.NPREPAT----	NPREPAT 3994
C		NPREPAT 3995
	COMMON /BOUND/ BCXS(400), BCXP(400), BCHGS(1000), BCHGP(1000),	NPREPAT 3996
Z	BCTGS(1000), BCTGP(1000), BCQGS(1000), BCQGP(1000),	NPREPAT 3997
Z	BCPGS(1000), BCPGP(1000), THUBIN(400), THUB(80),	NPREPAT 3998
Z	QHUBIN(400), QHUB(80), TTIPIN(400), TTIP(80),	NPREPAT 3999
Z	QTIPIN(400), QTIP(80), RHOVG(400), PEX(400),	NPREPAT 4000
Z	BCTIME(50), TTIO(50), PTIO(50), WPLEN,	NPREPAT 4001
Z	WSVST(50), AKCTBL(20), AKWTBL(20), NBCS, NBCP	NPREPAT 4002
C		NPREPAT 4003
	COMMON /FLMCO/ RHOVGA(80), PG(80), XFC(80), FLMEFF(80),	NPREPAT 4004
Z	XMUC(80), LMES(80), REFC(80), NFCSUP(80)	NPREPAT 4005
C		NPREPAT 4006
	COMMON /FRIC/ ALPHA, BETA, DELTA, EPS	NPREPAT 4007
C		NPREPAT 4008
	COMMON /PRPS/ CPO, GAMO, DP(80), SP(80), RE(80),	NPREPAT 4009
Z	CPC(80), GAMC(80), DUMR1(80), DUMR2(80)	NPREPAT 4010
C		NPREPAT 4011
	COMMON /SPECL/ CHANL(8000), TITLE(30), INDCHN(2000),	NPREPAT 4012
Z	IPLT, MD1, MD2, MD3, IADJIN, IWRITE	NPREPAT 4013
C		NPREPAT 4014
	COMMON /TCC/ ADUMP, BTA, CD, CP,	NPREPAT 4015
Z	GAM, PIM, R, SPAN, TGG,	NPREPAT 4016
Z	WDUMP, WIM, AKC(15,80), AKW(15,80),	NPREPAT 4017
Z	A(400), AJET(80), AM2(80), CNUM(80),	NPREPAT 4018
Z	DH(80), DHF(80), DHJ(80),	NPREPAT 4019
Z	DLX(400), FF(80), HC(80), HG(80),	NPREPAT 4020

Z	P(2,15,80),	PEXIT(15),	PUMP(80),	QG(80),	NPREPAT 4021
Z	QSNK(80),	RR(80),	S(15),	T(2,15,400),	NPREPAT 4022
Z	TG(80),	TAU(400),	WFC(80),		NPREPAT 4023
Z	WJ(15,80),	WCROS(2,15,80),	XN(80),		NPREPAT 4024
Z	ICOR,	IFILM,	IHUB,	ITIP,	NPREPAT 4025
Z	ISBLOK,	ISLICE,	NBLKSZ,	NSLICE,	NPREPAT 4026
Z	NFWD,	NSTA,	IHC(80)		NPREPAT 4027
C	COMMON /TRANSNT/	RHOC,	RHOM,	SPHTC,	NPREPAT 4028
		DLTYME,	TYME,	TEPS,	NPREPAT 4029
Z				TYMMAX	NPREPAT 4030
C					NPREPAT 4031
C					NPREPAT 4032
C					NPREPAT 4033
C	ICHNL IS THE CHANNEL NUMBER; = 1 FOR THE HUB REGION,				NPREPAT 4034
C				= NSLICE AT THE TIP	NPREPAT 4035
C					NPREPAT 4036
C					NPREPAT 4037
C	-- LOCATE INPUT DATA FOR THIS CHANNEL AND STORE IT IN WORKING ARRAYS.				NPREPAT 4038
C					NPREPAT 4039
C	I1 IS THE STARTING POINT IN THE INDCHN ARRAY FOR THIS CHANNEL				NPREPAT 4040
C					NPREPAT 4041
	I1 = INDCHN(ICHNL)				NPREPAT 4042
	IF (ICHNL.NE.INDCHN(I1)) GO TO 290				NPREPAT 4043
C					NPREPAT 4044
C	-- IF ABOVE TEST IS TRUE, THEN THE DATA IS NOT STORED WHERE EXPECTED				NPREPAT 4045
C					NPREPAT 4046
10	CONTINUE				NPREPAT 4047
	IFILM = INDCHN(I1+1)				NPREPAT 4048
	ICOR = INDCHN(I1+2)				NPREPAT 4049
	NFWD = INDCHN(I1+3)				NPREPAT 4050
	NSTA = INDCHN(I1+4)				NPREPAT 4051
	ISBLOK = INDCHN(I1+5)				NPREPAT 4052
	NBLKSZ = INDCHN(I1+6)				NPREPAT 4053
	IPLT = INDCHN(I1+7)				NPREPAT 4054
	MD1 = INDCHN(I1+8)				NPREPAT 4055
	MD2 = INDCHN(I1+9)				NPREPAT 4056
	IHUB = INDCHN(I1+12)				NPREPAT 4057
	ITIP = INDCHN(I1+13)				NPREPAT 4058
	IN1 = I1 + 14				NPREPAT 4059
	CD = CHANL(ISBLOK)				NPREPAT 4060
	ALPHA = CHANL(ISBLOK+1)				NPREPAT 4061
	BETA = CHANL(ISBLOK+2)				NPREPAT 4062
	DELTA = CHANL(ISBLOK+3)				NPREPAT 4063
	EPS = CHANL(ISBLOK+4)				NPREPAT 4064
	ADUMP = CHANL(ISBLOK+6)				NPREPAT 4065
	SPAN = CHANL(ISBLOK+7)				NPREPAT 4066
	S(ICHNL) = SPAN				NPREPAT 4067
	BTA = CHANL(ISBLOK+8)				NPREPAT 4068
	DLTYME = CHANL(ISBLOK+9)				NPREPAT 4069
	TEPS = CHANL(ISBLOK+10)				NPREPAT 4070
	NODSF = 5*NFWD				NPREPAT 4071
	NODST = 5*NSTA				NPREPAT 4072
	I1 = ISBLOK + 14				NPREPAT 4073
	I3 = ISBLOK + 14 + 2*NODST				NPREPAT 4074
C*****					NPREPAT 4075
12	CONTINUE				NPREPAT 4076
	DO 205 I = 1,NODST				NPREPAT 4077
	IM = I1 + I				NPREPAT 4078
	TAU(I) = CHANL(IM)				NPREPAT 4079
	A(I) = TAU(I)*SPAN				NPREPAT 4080

	IM = IM + NODST	NPREPAT 4081
205	DLX(I) = CHANL(IM)	NPREPAT 4082
	DO 215 I = 1, NSTA	NPREPAT 4083
	IFLU = 5*I	NPREPAT 4084
	DH(I) = 4.0*A(IFLU)/(2.*(SPAN+TAU(IFLU)))	NPREPAT 4085
	IM = I3 + I	NPREPAT 4086
	DHJ(I) = CHANL(IM)	NPREPAT 4087
	IM = IM + NSTA	NPREPAT 4088
	DHF(I) = CHANL(IM)	NPREPAT 4089
	IM = IM + NSTA	NPREPAT 4090
	XN(I) = CHANL(IM)	NPREPAT 4091
14	CONTINUE	NPREPAT 4092
	IF (DHJ(I).GT.0.0.AND.XN(I).GT.0.0) GO TO 202	NPREPAT 4093
	AJET(I) = 0.0	NPREPAT 4094
	GO TO 212	NPREPAT 4095
202	CONTINUE	NPREPAT 4096
	XOD=XN(I)/DHJ(I)	NPREPAT 4097
	IF(XOD.LT.3.1.OR.XOD.GT.12.5)WRITE(6,527)I,XOD	NPREPAT 4098
527	FORMAT(1H0,' WARNING, RATIO OF JET HOLE SPACING TO JET DIAMETER	NPREPAT 4099
	1'FOR JET ',I2,' IS',F10.4,' WHICH IS OUT OF'/	NPREPAT 4100
	2' THE RANGE OF VALIDITY OF THE CORRELATION.')	NPREPAT 4101
	CNUM(I)=SPAN/XN(I)	NPREPAT 4102
C	CNUM IS THE NUMBER OF IMPINGEMENT JETS AT CHANNEL NODE I	NPREPAT 4103
C	TOTAL JET AREA IS (AREA OF ONE JET)*(NUMBER OF JETS)	NPREPAT 4104
C		NPREPAT 4105
54	AJET(I)=3.14159*DHJ(I)**2/4.*CNUM(I)	NPREPAT 4106
212	CONTINUE	NPREPAT 4107
	IM = IM + NSTA	NPREPAT 4108
	FR(I) = CHANL(IM)	NPREPAT 4109
	IM = IM + NSTA	NPREPAT 4110
	DE(I) = CHANL(IM)	NPREPAT 4111
	IM = IM + NSTA	NPREPAT 4112
	SP(I) = CHANL(IM)	NPREPAT 4113
	IM = IM + NSTA	NPREPAT 4114
	IM = IM + NSTA	NPREPAT 4115
	INN = IN1 + I	NPREPAT 4116
	IHC(I) = INDCHN(INN)	NPREPAT 4117
215	CONTINUE	NPREPAT 4118
C*****		NPREPAT 4119
C		NPREPAT 4120
C--	NOW, GIVEN SLICE, ICHNL, EVALUATE B.C. AT METAL NODE POINTS. IN THE	NPREPAT 4121
C	FOLLOWING:	NPREPAT 4122
C--	XS & XP ARE DISTANCE FROM LEADING EDGE, ALONG OUTSIDE SURFACE	NPREPAT 4123
C	(INCHES), FOR SUCTION & PRESSURE SIDES.	NPREPAT 4124
C--	THE CONVENTIONS USED IN THE FOLLOWING ARE: INDEX BEGINING WITH -I-	NPREPAT 4125
C--	IS A SLICE INDEX, INDEX BEGINING WITH -N- IS A TIME INDEX, INDEX	NPREPAT 4126
C--	BEGINING WITH -L- IS A N X INDEX, AND AN INDEX BEGINING WITH -J- IS	NPREPAT 4127
C--	A PROPERTY INDEX I.E. HG, QG, TG, PG.	NPREPAT 4128
C		NPREPAT 4129
C--	FIRST, CHECK THAT THIS IS A TRANSIENT CASE, AND DETERMINE THE MAX.	NPREPAT 4130
C--	BCTIME INDEX, NMX.	NPREPAT 4131
	NMX = 1	NPREPAT 4132
310	IF (BCTIME(NMX+1).LE.0.0) GO TO 315	NPREPAT 4133
	NMX = NMX + 1	NPREPAT 4134
	GO TO 310	NPREPAT 4135
315	CONTINUE	NPREPAT 4136
C		NPREPAT 4137
C--	NOW, IF THIS IS A TRANSIENT, FIND THE LOCATION IN THE BCTIME ARRAY	NPREPAT 4138
C--	OF THE CURRENT TIME, AND CALCULATE THE VALUE OF THE INTERPOLATING	NPREPAT 4139
C--	PARAMETER, TMFRAC.	NPREPAT 4140

TMFRAC = 0.0	NPREPAT 4141
NLST = 1	NPREPAT 4142
IF (NMX.EQ.1.OR.TYME.LE.0.0) GO TO 330	NPREPAT 4143
C-- THE ABOVE TRANSFER OCCURS IF THIS IS A STEADY STATE PROBLEM	NPREPAT 4144
C-- THE FOLLOWING TRANSFER OCCURS IF WE ARE BEYOND THE LAST BCTIME ENTRY	NPREPAT 4145
NLST = NMX	NPREPAT 4146
IF (TYME.GE.BCTIME(NMX)) GO TO 330	NPREPAT 4147
NMXM1 = NMX - 1	NPREPAT 4148
DO 320 N = 1,NMXM1	NPREPAT 4149
NLST = N	NPREPAT 4150
IF (TYME.GE.BCTIME(N).AND.TYME.LT.BCTIME(N+1)) GO TO 325	NPREPAT 4151
320 CONTINUE	NPREPAT 4152
325 TMFRAC = (TYME-BCTIME(NLST))/(BCTIME(NLST+1)-BCTIME(NLST))	NPREPAT 4153
C	NPREPAT 4154
C-- NEXT, SEARCH THE BCXS & BCXP ARRAYS TO FIND THE X INTERPOLATING	NPREPAT 4155
C-- FACTORS, XSF & XPF, FOR POSITIONS XS & XP, SLICE ICHNL.	NPREPAT 4156
C-- THE BRACKETING INDICES ARE LBLWS & LABVS AND LBLWP & LABVP.	NPREPAT 4157
C	NPREPAT 4158
C-- THE STARTING POINTS IN THE BCXS & BCXP ARRAYS FOR THIS SLICE ARE:	NPREPAT 4159
C	NPREPAT 4160
330 LSS = (ICHNL-1)*NBCS	NPREPAT 4161
LSP = (ICHNL-1)*NBCP	NPREPAT 4162
XS = 0.0	NPREPAT 4163
XP = 0.0	NPREPAT 4164
C	NPREPAT 4165
C-- THE STARTING POINTS IN THE PROPERTY ARRAYS, FOR THE LATEST TIME STEP	NPREPAT 4166
C-- ARE GIVEN BY:	NPREPAT 4167
C	NPREPAT 4168
JS1S = NSLICE*(NLST-1)*NBCS + LSS	NPREPAT 4169
JS1P = NSLICE*(NLST-1)*NBCP + LSP	NPREPAT 4170
IF (NMX.EQ.NLST) GO TO 335	NPREPAT 4171
JS2S = JS1S + NSLICE*NBCS	NPREPAT 4172
JS2P = JS1P + NSLICE*NBCP	NPREPAT 4173
335 HG(1) = BCHGS(JS1S+1) + TMFRAC*(BCHGS(JS2S+1)-BCHGS(JS1S+1))	NPREPAT 4174
TG(1) = BCTGS(JS1S+1) + TMFRAC*(BCTGS(JS2S+1)-BCTGS(JS1S+1))	NPREPAT 4175
QG(1) = BCQGS(JS1S+1) + TMFRAC*(BCQGS(JS2S+1)-BCQGS(JS1S+1))	NPREPAT 4176
PG(1) = BCPGS(JS1S+1) + TMFRAC*(BCPGS(JS2S+1)-BCPGS(JS1S+1))	NPREPAT 4177
C	NPREPAT 4178
DO 350 K = 2,NSTA,2	NPREPAT 4179
C-- THE OUTSIDE SURFACE NODE NUMBERS FOR S & P SIDES ARE:	NPREPAT 4180
NNS = 5*K - 4	NPREPAT 4181
NNP = 5*K + 1	NPREPAT 4182
XS = XS + DLX(NNS)	NPREPAT 4183
XP = XP + DLX(NNP)	NPREPAT 4184
C	NPREPAT 4185
DO 340 L = 1,NBCS	NPREPAT 4186
LBLWS = LSS + L - 1	NPREPAT 4187
LABVS = LSS + L	NPREPAT 4188
IF (BCXS(LABVS).GT.XS) GO TO 342	NPREPAT 4189
340 CONTINUE	NPREPAT 4190
C	NPREPAT 4191
C-- INSERT ERROR MESSAGE HERE-- EXTRAPOLATING BEYOND THE BCXS TABLE	NPREPAT 4192
C	NPREPAT 4193
342 XSF = (XS-BCXS(LBLWS))/(BCXS(LABVS)-BCXS(LBLWS))	NPREPAT 4194
C	NPREPAT 4195
DO 345 L = 1,NBCP	NPREPAT 4196
LBLWP = LSP + L - 1	NPREPAT 4197
LABVP = LSP + L	NPREPAT 4198
IF (BCXP(LABVP).GT.XP) GO TO 347	NPREPAT 4199
345 CONTINUE	NPREPAT 4200

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C
C-- INSERT ERROR MESSAGE HERE-- EXTRAPOLATING BEYOND THE BCXP TABLE
C
347   XPF = (XP-BCXP(LBLOWP))/(BCXP(LABOVP)-BCXP(LBLOWP))
C
C-- NOW THE FRACTIONS ARE KNOWN, CALCULATE THE INTERPOLATED PROPERTIES.
C-- FIRST, FOR THE STEADY STATE OR FOR TIMES BEYOND THE LAST BCTIME:
C
   JB1S = NSLICE*(NLST-1)*NBCS + LBLOWS
   JB1P = NSLICE*(NLST-1)*NBCP + LBLOWP
   HG(K) = BCHGS(JB1S) + XSF*(BCHGS(JB1S+1)-BCHGS(JB1S))
   HG(K+1) = BCHGP(JB1P) + XPF*(BCHGP(JB1P+1)-BCHGP(JB1P))
   QG(K) = BCQGS(JB1S) + XSF*(BCQGS(JB1S+1)-BCQGS(JB1S))
   QG(K+1) = BCQGP(JB1P) + XPF*(BCQGP(JB1P+1)-BCQGP(JB1P))
   TG(K) = BCTGS(JB1S) + XSF*(BCTGS(JB1S+1)-BCTGS(JB1S)) + 460.
   TG(K+1) = BCTGP(JB1P) + XPF*(BCTGP(JB1P+1)-BCTGP(JB1P)) + 460.
   PG(K) = BCPGS(JB1S) + XSF*(BCPGS(JB1S+1)-BCPGS(JB1S))
   PG(K+1) = BCPGP(JB1P) + XPF*(BCPGP(JB1P+1)-BCPGP(JB1P))
C
   IF (NMX.EQ.1.OR.TYME.GE.BCTIME(NMX).OR.TYME.LE.0.0) GO TO 350
   JB2S = NSLICE*NLST*NBCS + LBLOWS
   JB2P = NSLICE*NLST*NBCP + LBLOWP
   AHG = BCHGS(JB2S) + XSF*(BCHGS(JB2S+1)-BCHGS(JB2S))
   HG(K) = HG(K) + TMFRAC*(AHG-HG(K))
   AHG = BCHGP(JB2P) + XPF*(BCHGP(JB2P+1)-BCHGP(JB2P))
   HG(K+1) = HG(K+1) + TMFRAC*(AHG-HG(K+1))
   AQG = BCQGS(JB2S) + XSF*(BCQGS(JB2S+1)-BCQGS(JB2S))
   QG(K) = QG(K) + TMFRAC*(AQG-QG(K))
   AQG = BCQGP(JB2P) + XPF*(BCQGP(JB2P+1)-BCQGP(JB2P))
   QG(K+1) = QG(K+1) + TMFRAC*(AQG-QG(K+1))
   ATG = BCTGS(JB2S) + XSF*(BCTGS(JB2S+1)-BCTGS(JB2S)) + 460.
   TG(K) = TG(K) + TMFRAC*(ATG-TG(K))
   ATG = BCTGP(JB2P) + XPF*(BCTGP(JB2P+1)-BCTGP(JB2P)) + 460.
   TG(K+1) = TG(K+1) + TMFRAC*(ATG-TG(K+1))
   APG = ECPGS(JB2S) + XSF*(BCPGS(JB2S+1)-BCPGS(JB2S))
   PG(K) = PG(K) + TMFRAC*(APG-PG(K))
   APG = ECPGP(JB2P) + XPF*(BCPGP(JB2P+1)-BCPGP(JB2P))
   PG(K+1) = PG(K+1) + TMFRAC*(APG-PG(K+1))
350  CONTINUE
      RETURN
200  WRITE(6,295) ICHNL
205  FORMAT(// ' CHANNEL NO. ',I3,' DATA STORAGE IS MESSED UP',
Z      ' **><;:%%%%&@&$?***%***')
149  CONTINUE
      RETURN
      END

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NPREPAT 4201
NPREPAT 4202
NPREPAT 4203
NPREPAT 4204
NPREPAT 4205
NPREPAT 4206
NPREPAT 4207
NPREPAT 4208
NPREPAT 4209
NPREPAT 4210
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NPREPAT 4241
NPREPAT 4242
NPREPAT 4243
NPREPAT 4244
NPREPAT 4245
NPREPAT 4246


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C----SOURCE.NTARAYT
      SUBROUTINE 'TARRAY(JS,JSENS,DELTAN)
C
C-   SOURCE.NTARAYT----
C
C
C+++++ A SUBROUTINE TO SET UP THE COEFFICIENT ARRAY TO SOLVE FOR
C       BLADE TEMPERATURES, TRANSIENT CALCULATIONS.
C       FIRST PUT TOGETHER FROM STEADY STATE PROGRAM, NOVEMBER 24, 1975
C
C
C*****
C*****
C

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NTARAYT 4247
NTARAYT 4248
NTARAYT 4249
NTARAYT 4250
NTARAYT 4251
NTARAYT 4252
NTARAYT 4253
NTARAYT 4254
NTARAYT 4255
NTARAYT 4256
NTARAYT 4257
NTARAYT 4258
NTARAYT 4259
NTARAYT 4260

124

	Z	ISBLOK,	ISLICE,	NBLKSZ,	NSLICE,	NTARAYT	4321
	Z	NFWD,	NSTA,	IHC(80)		NTARAYT	4322
C		COMMON /TRNSNT/	RHOC,	RHOM,	SPHTC,	NTARAYT	4323
	Z		DLTYME,	TYME,	SPHTM,	NTARAYT	4324
		DIMENSION	EFAREA(80),	DELTAN(15)	TEPS,	NTARAYT	4325
					TYMMAX	NTARAYT	4326
C						NTARAYT	4327
		RTRNVM = 0.				NTARAYT	4328
		RCHRD = 0.				NTARAYT	4329
		TREPS = 1.0				NTARAYT	4330
		IF (TYME.GE.0.)	TREPS =	TEPS		NTARAYT	4331
		HX = 1.0				NTARAYT	4332
		RCVRY = .89				NTARAYT	4333
300		CONTINUE				NTARAYT	4334
		SPAN = S(ISLICE)				NTARAYT	4335
		NODST = 5*NSTA				NTARAYT	4336
		NODSF = 5*NFW				NTARAYT	4337
		DO 308 J = 1,30				NTARAYT	4338
		DO 308 I = 1,400				NTARAYT	4339
308		TCOF(I,J) = 0.0				NTARAYT	4340
		DO 309 I = 1,9				NTARAYT	4341
		ICO = NODST + I				NTARAYT	4342
309		DLX(ICO) = 0.0				NTARAYT	4343
		ICOMS = JS + 2 - 4*JS	SENS			NTARAYT	4344
		ICOMP = JS - 2 + 4*JS	SENS			NTARAYT	4345
		C****ICOMS IS STATION	ADJACENT TO JS, IN	SUCTION	DIRECTION	NTARAYT	4346
		C****ICOMP IS STATION	ADJACENT TO JS, IN	PRESSURE	DIRECTION	NTARAYT	4347
		IF (ICOMS.LT.0)	ICOMS=2			NTARAYT	4348
		IF (ICOMP.LT.1)	ICOMP=1			NTARAYT	4349
310		CONTINUE				NTARAYT	4350
C						NTARAYT	4351
C**		BEGIN OVERALL LOOP, WHERE	LOOP VARIABLE (IS) IS	THE STATION	NUMBER	NTARAYT	4352
C						NTARAYT	4353
		DO 440 IS = 1,NSTA				NTARAYT	4354
		ISUP = IS - 2				NTARAYT	4355
		YIMP = 0.0				NTARAYT	4356
		YFINS = 0.0				NTARAYT	4357
		YCONV = 0.0				NTARAYT	4358
		YIMPU = 0.0				NTARAYT	4359
		YFINSU = 0.0				NTARAYT	4360
		YCONVU = 0.0				NTARAYT	4361
		YIMPUU = 0.0				NTARAYT	4362
		YFNSUU = 0.0				NTARAYT	4363
		YCNVUU = 0.0				NTARAYT	4364
		IF (IHC(IS).EQ.1)	YIMP=1.0			NTARAYT	4365
		IF (IHC(IS).EQ.2)	YCONV= (1.0+RCVRY*AN2	(IS)* (GAMC	(IS) -1.) /2.)	NTARAYT	4366
		IF (IHC(IS).EQ.3)	YFINS=1.0			NTARAYT	4367
		FACTOR = 1.0				NTARAYT	4368
		IF (IS.EQ.ICOMS.OR.IS.EQ.ICOMP)	FACTOR = .5			NTARAYT	4369
		ISENS = 0				NTARAYT	4370
		ISEN = IS - 2*(IS/2)				NTARAYT	4371
C						NTARAYT	4372
C		IF (IS.GT.NFW+1)--	IN TRAILING EDGE	REGION, GO	TO 380	NTARAYT	4373
C						NTARAYT	4374
		IF (IS.GT.NFW+1)	GO TO 380			NTARAYT	4375
C						NTARAYT	4376
		J9 = 16				NTARAYT	4377
		LCOOL = 5*IS				NTARAYT	4378
		LIN =LCOOL-1				NTARAYT	4379
		L =LCOOL-2				NTARAYT	4380

LJ	=LCOOL - 3	NTARAYT	4381
LOUT	=LCOOL-4	NTARAYT	4382
IF (IHC(IS).NE.2)	GO TO 320	NTARAYT	4383
C		NTARAYT	4384
C	FORCED CONVECTION HC:	NTARAYT	4385
	TMP = (T(2,ISLICE,LCOOL) + T(2,ISLICE,LIN))/2.	NTARAYT	4386
	CALL GASTBL(TMP,C,CP,GAM,PD,R,XMU)	NTARAYT	4387
	RE(IS) = 12.*3600.*ABS(WCROS(2,ISLICE,IS))*DH(IS)/(A(LCOOL)*XMU)	NTARAYT	4388
	HC(IS) = .023*12.*(C/DH(IS))*(RE(IS)**.8)*(PD**.333)	NTARAYT	4389
C		NTARAYT	4390
320	CONTINUE	NTARAYT	4391
	IF (IS.GE.JS) GO TO 322	NTARAYT	4392
C		NTARAYT	4393
C	SPECIAL CASE FOR STATION NUMBER 1:	NTARAYT	4394
	IF(IS.EQ.1) ISUP = 2	NTARAYT	4395
C		NTARAYT	4396
C	IF STATION IS FORWARD OF FLOW SPLIT, AND ON SAME SIDE, GO TO 370	NTARAYT	4397
	IF (ISEN.EQ.JSENS) GO TO 370	NTARAYT	4398
C		NTARAYT	4399
322	CONTINUE	NTARAYT	4400
	IF (ISUP.LT.1) ISUP = 1	NTARAYT	4401
	IF (IHC(ISUP).EQ.1) YIMPU = 1.0	NTARAYT	4402
	IF (IHC(ISUP).EQ.2) YCONVU=1.0+RCVRY*AM2(ISUP)*(GAMC(ISUP)-1.)/2.	NTARAYT	4403
	IF (IHC(ISUP).EQ.3) YFINSU = 1.0	NTARAYT	4404
	LCUP = LCOOL - 10	NTARAYT	4405
	LCUPS = LCOOL - 11	NTARAYT	4406
	LUP = LCOOL - 12	NTARAYT	4407
	LDN = LCOOL + 8	NTARAYT	4408
	IF (IS.NE.2) GO TO 324	NTARAYT	4409
C		NTARAYT	4410
C	IF THIS IS STATION NUMBER 2:	NTARAYT	4411
	LCUP = 5	NTARAYT	4412
	LCUPS = 4	NTARAYT	4413
	LUP = 3	NTARAYT	4414
324	CONTINUE	NTARAYT	4415
	IF (IS.GT.1) GO TO 326	NTARAYT	4416
C		NTARAYT	4417
C	IF THIS IS STATION NUMBER 1:	NTARAYT	4418
	LCUP = 10	NTARAYT	4419
	LCUPS = 9	NTARAYT	4420
	LUP = 8	NTARAYT	4421
326	CONTINUE	NTARAYT	4422
C		NTARAYT	4423
C	IS = 1, STATION NO. 1, LEADING EDGE NODES	NTARAYT	4424
C		NTARAYT	4425
	IF (IS.NE.JS) GO TO 330	NTARAYT	4426
C		NTARAYT	4427
C	*****	NTARAYT	4428
C	*****	NTARAYT	4429
C	***** THIS BLOCK COMPUTES TCOF ELEMENTS FOR THE STATION AT WHICH	NTARAYT	4430
C	THE FLOW SPLITS	NTARAYT	4431
C	***** IS = JS	NTARAYT	4432
C	*****	NTARAYT	4433
C	*****	NTARAYT	4434
C		NTARAYT	4435
328	CONTINUE	NTARAYT	4436
	DX1 = DLX(LUP)	NTARAYT	4437
	IF (DX1.EQ.0.0) DX1 = DLX(L)	NTARAYT	4438
	DX2 = DLX(LDN)	NTARAYT	4439
	IF (DX2.EQ.0.0) DX2 = DLX(L)	NTARAYT	4440

DX3 = DLX(LUP-2)	NTARAYT 4441
IF (DX3.EQ.0.0) DX3 = DLX(LOUT)	NTARAYT 4442
DX4 = DLX(LDN-2)	NTARAYT 4443
IF (DX4.EQ.0.0) DX4 = DLX(LOUT)	NTARAYT 4444
DX5 = DLX(LUP+1)	NTARAYT 4445
IF (DX5.EQ.0.0) DX5 = DLX(LIN)	NTARAYT 4446
DX6 = DLX(LDN+1)	NTARAYT 4447
IF (DX6.EQ.0.0) DX6 = DLX(LIN)	NTARAYT 4448
DX9 = DLX(LUP-1)	NTARAYT 4449
IF (DX9.EQ.0.0) DX9 = DLX(LJ)	NTARAYT 4450
DX10 = DLX(LDN-1)	NTARAYT 4451
IF (DX10.EQ.0.) DX10 = DLX(LJ)	NTARAYT 4452
CURV = 1.0 + (DX9+DX10)/(DX3+DX4)	NTARAYT 4453
C	NTARAYT 4454
C CURV IS A MEASURE OF THE CURVATURE OF THE BLADE AT STATION IS.	NTARAYT 4455
C CURV = 2.0 IS A STRAIGHT SECTION OF WALL,	NTARAYT 4456
C CURV < 2.0 IS A CONVEX SECTION, AND	NTARAYT 4457
C CURV > 2.0 IS A CONCAVE SECTION	NTARAYT 4458
C	NTARAYT 4459
TRTRMC = 0.0	NTARAYT 4460
IF (DLTYME.GT.0.0.AND.TYME.GE.0.) TRTRMC=(3600./144.)*RHOC*SPHTC*	NTARAYT 4461
Z (TAU(LOUT)**2)/(4.*AKC(ISLICE,IS)*DLTYME)	NTARAYT 4462
TCOF(LOUT,13) = -TREPS + TRTRMC*CURV	NTARAYT 4463
TCOF(LOUT,12)=TRTRMC*CURV + TREPS*(1.0+(1.0-BTA)*HG(IS)*TAU(LOUT)/	NTARAYT 4464
Z (12.*AKC(ISLICE,IS)))	NTARAYT 4465
TCOF(LOUT,J9) = -(1.-BTA)*TREPS*FLMEFF(IS)*HG(IS)*TAU(LOUT)/	NTARAYT 4466
Z (12.*AKC(ISLICE,IS)))	NTARAYT 4467
TCOF(LOUT,24) = (BTA*QG(IS) + (1.0-BTA)*HG(IS)*TG(IS)*	NTARAYT 4468
Z (1.0-FLMEFF(IS))*TAU(LOUT)/(12.*AKC(ISLICE,IS))	NTARAYT 4469
Z - T(1,ISLICE,LOUT)*((1.-TREPS)*((1.-BTA)*HG(IS)*TAU(LOUT)/	NTARAYT 4470
Z (12.*AKC(ISLICE,IS)) + 1.) - TRTRMC*CURV)	NTARAYT 4471
Z + T(1,ISLICE,LJ)*(1.-TREPS+TRTRMC*CURV)	NTARAYT 4472
Z + T(1,ISLICE,LCOOL)*(1.-TREPS)*FLMEFF(IS)*(1.-BTA)*HG(IS)*	NTARAYT 4473
Z TAU(LOUT)/(12.*AKC(ISLICE,IS))	NTARAYT 4474
C	NTARAYT 4475
TCOF(LJ,11) = TREPS	NTARAYT 4476
TCOF(LJ,13) = TREPS*(AKW(ISLICE,IS)/AKC(ISLICE,IS))*	NTARAYT 4477
Z (2.*TAU(LOUT)/TAU(L))*(DX1+DX2+DX3+DX4)/(DX9+DX10+DX3+DX4)	NTARAYT 4478
TCOF(LJ,12) = -TCOF(LJ,11) -TCOF(LJ,13)	NTARAYT 4479
TCOF(LJ,24) = (1.-TREPS)*((T(1,ISLICE,LJ)-T(1,ISLICE,LOUT)) +	NTARAYT 4480
Z (T(1,ISLICE,LJ)-T(1,ISLICE,L))*TCOF(LJ,13)/TREPS)	NTARAYT 4481
C	NTARAYT 4482
J1 = 12 - L + LUP	NTARAYT 4483
J2 = 12 - L + LDN	NTARAYT 4484
C	NTARAYT 4485
THETA1 = (DX1+DX2+DX5+DX6)/(DX1+DX2+DX9+DX10)	NTARAYT 4486
THETA2 = ((TAU(L)+TAU(LUP))/(2.*DX1))*2.*TAU(L)/(DX1+DX2+DX9+DX10)	NTARAYT 4487
THETA3 = ((TAU(L)+TAU(LDN))/(2.*DX2))*2.*TAU(L)/(DX1+DX2+DX9+DX10)	NTARAYT 4488
THETA6 = 24.*TAU(L)/(AKW(ISLICE,IS)*S(ISLICE)*(DX1+DX2+DX9+DX10))	NTARAYT 4489
THETA4 = 0.0	NTARAYT 4490
THETA5 = 0.0	NTARAYT 4491
HUB1 = 0.0	NTARAYT 4492
HUB3 = 0.0	NTARAYT 4493
TIP1 = 0.0	NTARAYT 4494
TIP3 = 0.0	NTARAYT 4495
IF (ISLICE.EQ.1) GO TO 3290	NTARAYT 4496
C	NTARAYT 4497
C FOR A SLICE THAT IS NOT AT THE HUB OF THE BLADE:	NTARAYT 4498
C	NTARAYT 4499
THETA4 = (TAU(L)/S(ISLICE))*(TAU(L)/(S(ISLICE)+S(ISLICE-1)))*	NTARAYT 4500

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Z          2.*(DX1+DX2)/(DX1+DX2+DX9+DX10)          NTARAYT 4501
IF (ISLICE.EQ.NSLICE) GO TO 3292          NTARAYT 4502
THETA5 = THETA4*(S(ISLICE)+S(ISLICE-1))/(S(ISLICE)+S(ISLICE+1))          NTARAYT 4503
TBELOW = T(1,ISLICE-1,L)          NTARAYT 4504
TABOVE = T(1,ISLICE+1,L)          NTARAYT 4505
GO TO 3294          NTARAYT 4506
C          NTARAYT 4507
C FOR THE SLICE AT THE HUB END OF THE BLADE:          NTARAYT 4508
C          NTARAYT 4509
3290 CONTINUE          NTARAYT 4510
IF (IHUB.EQ.1) HUB1 = ((DX1+DX2)/(DX1+DX2+DX9+DX10))*          NTARAYT 4511
Z          (2.*(TAU(L)/S(1))**2)          NTARAYT 4512
C FOR IHUB = 1, HUB TEMPERATURE IS SPECIFIED*****          NTARAYT 4513
THETA5 = 0.0          NTARAYT 4514
IF (NSLICE.GT.1) THETA5 = (TAU(L)/S(1))*(TAU(L)/(S(1)+S(2)))*          NTARAYT 4515
Z          (2.*(DX1+DX2)/(DX1+DX2+DX9+DX10))          NTARAYT 4516
IF (IHUB.EQ.3) HUB3 = ((DX1+DX2)/(DX1+DX2+DX9+DX10))*(TAU(L)**2)/          NTARAYT 4517
Z          (AKW(1,IS)*12.*S(1))          NTARAYT 4518
C IHUB = 3, THE HEAT FLUX AT THE HUB END IS SPECIFIED (BTU/HR FT**2) ***          NTARAYT 4519
TBELOW = T(1,1,L)          NTARAYT 4520
IF (IHUB.EQ.1) TBELOW = THUB(IS)          NTARAYT 4521
TABOVE = T(1,1,L)          NTARAYT 4522
IF (NSLICE.GT.1) TABOVE = T(1,2,L)          NTARAYT 4523
IF (NSLICE.GT.1) GO TO 3294          NTARAYT 4524
C          NTARAYT 4525
C FOR THE SLICE AT THE BLADE TIP, (IF THERE ARE MORE THAN 1 SLICES          NTARAYT 4526
C BEING CONSIDERED) : *****          NTARAYT 4527
C          NTARAYT 4528
3292 CONTINUE          NTARAYT 4529
IF (ITIP.EQ.1) TIP1 = ((DX1+DX2)/(DX1+DX2+DX9+DX10))*          NTARAYT 4530
Z          (2.*(TAU(L)/S(NSLICE))**2)          NTARAYT 4531
IF (NSLICE.GT.1) TBELOW = T(1,ISLICE-1,L)          NTARAYT 4532
IF (ITIP.EQ.3) TIP3 = ((DX1+DX2)/(DX1+DX2+DX9+DX10))*(TAU(L)**2)/          NTARAYT 4533
Z          (AKW(NSLICE,IS)*12.*S(NSLICE))          NTARAYT 4534
TABOVE = T(1,ISLICE,L)          NTARAYT 4535
IF (ITIP.EQ.1) TABOVE = TTIP(IS)          NTARAYT 4536
C          NTARAYT 4537
C          NTARAYT 4538
3294 CONTINUE          NTARAYT 4539
THETA9 = 0.0          NTARAYT 4540
IF (DLTYME.GT.0.0.AND.TYME.GE.0.) THETA9 = 2.*3600.*RHOM*SPHTM*          NTARAYT 4541
Z          (DX1+DX2)*(TAU(L)**2)/(144.*AKW(ISLICE,IS)*          NTARAYT 4542
Z          (DX1+DX2+DX9+DX10)*DLTYME)          NTARAYT 4543
C          NTARAYT 4544
TCOF(L,11) = 1.0*TREPS          NTARAYT 4545
TCOF(L,13) = THETA1*TREPS          NTARAYT 4546
TCOF(L,J1) = THETA2*TREPS          NTARAYT 4547
TCOF(L,J2) = THETA3*TREPS          NTARAYT 4548
TCOF(L,12) = (-1.0 - THETA1 - THETA2 - THETA3 - THETA4 - THETA5 -          NTARAYT 4549
Z          HUB1 - TIP1)*TREPS - THETA9          NTARAYT 4550
TCOF(L,24) = QSNK(IS)*THETA6 - (THETA4+HUB1)*TBELOW          NTARAYT 4551
Z          -(THETA5+TIP1)*TABOVE - QHUB(IS)*HUB3 + QTIP(IS)*TIP3          NTARAYT 4552
Z          -(1-TREPS)*(T(1,ISLICE,LUP)*THETA2+T(1,ISLICE,LJ)          NTARAYT 4553
Z          +T(1,ISLICE,LIN)*THETA1+T(1,ISLICE,LDN)*THETA3)          NTARAYT 4554
Z          +T(1,ISLICE,L)*((1.0-TREPS)*(1.+THETA1+THETA2+THETA3          NTARAYT 4555
Z          +THETA4+THETA5+HUB1+TIP1) - THETA9)          NTARAYT 4556
C          NTARAYT 4557
C          NTARAYT 4558
AHTRN1 = (DX5 + DX6)*S(ISLICE)/2.          NTARAYT 4559
THETA8 = 2.*HX*HC(IS)*AHTRN1*TAU(L)/(12.*AKW(ISLICE,IS)*S(ISLICE)          NTARAYT 4560

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Z	*(DX1+DX2+DX5+DX6))	NTARAYT 4561
	TCOF(LIN,11) = TREPS	NTARAYT 4562
	TCOF(LIN,24) = - THETA8*TOG - (1.0-TREPS)*(T(1,ISLICE,L)	NTARAYT 4563
Z	-T(1,ISLICE,LIN)*(1.0+THETA8))	NTARAYT 4564
	TCOF(LIN,12) = (-1.0 - THETA8)*TREPS	NTARAYT 4565
C		NTARAYT 4566
	TCOF(LCOOL,12) = 1.0	NTARAYT 4567
	TCOF(LCOOL,24) = TOG	NTARAYT 4568
	IF (TYME.GT.0.) RCHRD = (144./3600.)*AKW(ISLICE,IS)*DLTYME/	NTARAYT 4569
Z	(RHOM*SPHTM*((DX1+DX2)/2.))**2)	NTARAYT 4570
	IF (TYME.GT.0.) RTRNV = (144./3600.)*AKW(ISLICE,IS)*DLTYME/	NTARAYT 4571
Z	(RHOM*SPHTM*(TAU(L)**2))	NTARAYT 4572
	IF (RCHRD.GT.RCHRDM) RCHRDM = RCHRD	NTARAYT 4573
	IF (RTRNV.GT.RTRNVM) RTRNVM = RTRNV	NTARAYT 4574
C		NTARAYT 4575
	GO TO 440	NTARAYT 4576
C		NTARAYT 4577
C		NTARAYT 4578
C		NTARAYT 4579
C		NTARAYT 4580
C		NTARAYT 4581
C		NTARAYT 4582
C		NTARAYT 4583
C		NTARAYT 4584
C		NTARAYT 4585
C	*****	NTARAYT 4586
C	*****	NTARAYT 4587
C	***** THIS BLOCK COMPUTES TCOF ELEMENTS FOR GENERAL FLOW STATIONS	NTARAYT 4588
C	*****	NTARAYT 4589
C	*****	NTARAYT 4590
C		NTARAYT 4591
330	CONTINUE	NTARAYT 4592
	DX1 = DLX(L)	NTARAYT 4593
	DX2 = DLX(LDN)	NTARAYT 4594
	DX3 = DLX(LOUT)	NTARAYT 4595
	DX4 = DLX(LDN-2)	NTARAYT 4596
	DX5 = DLX(LIN)	NTARAYT 4597
	DX6 = DLX(LDN+1)	NTARAYT 4598
	DX7 = DLX(LCOOL)	NTARAYT 4599
	DX9 = DLX(LJ)	NTARAYT 4600
	DX10 = DLX(LDN-1)	NTARAYT 4601
	IF (IS.GT.1) GO TO 332	NTARAYT 4602
C		NTARAYT 4603
	IF THIS IS STATION NUMBER 1:	NTARAYT 4604
	DX1 = DLX(LUP)	NTARAYT 4605
	DX9 = DLX(LUP-1)	NTARAYT 4606
	DX3 = DLX(LUP-2)	NTARAYT 4607
	DX5 = DLX(LUP+1)	NTARAYT 4608
	DX7 = DLX(LUP+2)	NTARAYT 4609
C		NTARAYT 4610
332	CONTINUE	NTARAYT 4611
	LCUPP = LCOOL - 5	NTARAYT 4612
	LCOOLP = LCOOL + 4	NTARAYT 4613
	J1 = 12 - L + LUP	NTARAYT 4614
	J2 = 12 - L + LDN	NTARAYT 4615
	J4 = 12 - LCOOL + LCUPS	NTARAYT 4616
	J5 = 12 - LCOOL + LCUP	NTARAYT 4617
	J6 = 12 - LCOOL + LCUPP	NTARAYT 4618
	J8 = 12 - LCOOL + LCOOLP	NTARAYT 4619
C		NTARAYT 4620
333	CONTINUE	

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AHTRN1 = (DX5 + DX6)*S(ISLICE)/2.
A1 = SPAN*DX5/2.
A2 = A1
A3 = 0.0
A4 = 0.0
C
IF (IHC(IS).EQ.3.AND.IS.LE.NFWD)
Z CALL HCPINS(IS,DELTAN,LCOOL,LCUP,LIN,LCOOLP,PINS,EFAREA)
IF (IHC(IS-2).EQ.3) A1 = EFAREA (IS-2)/2.
IF (IHC(IS).EQ.3) A2 = EFAREA (IS)/2.
IF (IHC(IS).EQ.3) AHTRN1 = EFAREA (IS)
C
I3 = 12 - LIN + LCOOL
340 CONTINUE
C
CURV = 1.0 + (DX9+DX10)/(DX3+DX4)
C
C*****
C NTARAYT 4621
C NTARAYT 4622
C NTARAYT 4623
C NTARAYT 4624
C NTARAYT 4625
C NTARAYT 4626
C NTARAYT 4627
C NTARAYT 4628
C NTARAYT 4629
C NTARAYT 4630
C NTARAYT 4631
C NTARAYT 4632
C NTARAYT 4633
C NTARAYT 4634
C NTARAYT 4635
C NTARAYT 4636
C NTARAYT 4637
C NTARAYT 4638
C NTARAYT 4639
C IN GENERAL; I3 = 13
C FOR MID-METAL NODE (L) : NTARAYT 4640
C TCOF(L,12), 12 REFERS TO NODE L J1 = 2 NTARAYT 4641
C (L,J1), J1 REFERS TO NODE LUP J2 = 22 NTARAYT 4642
C (L,J2), J2 REFERS TO NODE LDN J4 = 1 NTARAYT 4643
C (L,11), 11 REFERS TO NODE LJ J5 = 2 NTARAYT 4644
C (L,13), 13 REFERS TO NODE LIN J6 = 6 NTARAYT 4645
C FOR THE COOLANT NODE (LCOOL) : J8 = 16 NTARAYT 4646
C TCOF(LCOOL,12), 12 REFERS TO NODE LCOOL NTARAYT 4647
C (LCOOL,J4), J4 REFERS TO NODE LCUPS = LUP+1 NTARAYT 4648
C ,J5), J5 REFERS TO NODE LCUP NTARAYT 4649
C ,J6), J6 REFERS TO NODE LCUPP, (TRAILING EDGE REGION ONLY) NTARAYT 4650
C ,11), 11 REFERS TO NODE LIN NTARAYT 4651
C ,J8), J8 REFERS TO NODE LCOOLP, (TRAILING EDGE REGION ONLY) NTARAYT 4652
C NTARAYT 4653
C***** NTARAYT 4654
C NTARAYT 4655
C FOR OUTSIDE NODE: NTARAYT 4656
C NTARAYT 4657
C NTARAYT 4658
C TRTRMC = 0.0 NTARAYT 4659
C IF (DLTYME.GT.0.0.AND.TYME.GE.0.) TRTRMC = NTARAYT 4660
Z (3600./144.)*RHOC*SPHTC*(TAU(LOUT)**2)/(4.*AKC(ISLICE,IS)*DLTYME)
TCOF(LOUT,13) = -TREPS + TRTRMC*CURV NTARAYT 4661
TCOF(LOUT,12) = (1.0 + (1.0-BTA)*HG(IS)*TAU(LOUT)/ NTARAYT 4662
Z (12.*AKC(ISLICE,IS)))*TREPS + TRTRMC*CURV NTARAYT 4663
TCOF(LOUT,J9) = -(1.-BTA)*TREPS*FLMEFF(IS)*HG(IS)*TAU(LOUT)/ NTARAYT 4664
Z (12.*AKC(ISLICE,IS)) NTARAYT 4665
TCOF(LOUT,24) = (BTA*QG(IS) + (1.0-BTA)*HG(IS)*TG(IS)* NTARAYT 4666
Z (1.0-FLMEFF(IS))*TAU(LOUT)/(12.*AKC(ISLICE,IS)) NTARAYT 4667
Z - T(1,ISLICE,LOUT)*((1.-TREPS)*((1.-BTA)*HG(IS)*TAU(LOUT)/ NTARAYT 4668
Z (12.*AKC(ISLICE,IS)) + 1.) - TRTRMC*CURV) NTARAYT 4669
Z + T(1,ISLICE,LJ)*(1.-TREPS+TRTRMC*CURV) NTARAYT 4670
Z + T(1,ISLICE,LCOOL)*(1.-TREPS)*FLMEFF(IS)*(1.-BTA)*HG(IS)* NTARAYT 4671
Z TAU(LOUT)/(12.*AKC(ISLICE,IS)) NTARAYT 4672
C NTARAYT 4673
C NTARAYT 4674
C AT JUNCTION OF COATING AND METAL, NODE LJ: NTARAYT 4675
C NTARAYT 4676
C NTARAYT 4677
C TCOF(LJ,11) = TREPS NTARAYT 4678
C TCOF(LJ,13) = TREPS*(AKW(ISLICE,IS)/AKC(ISLICE,IS))* NTARAYT 4679
Z (2.*TAU(LOUT)/TAU(L))*(DX1+DX2+DX3+DX4)/(DX9+DX10+DX3+DX4) NTARAYT 4680
C TCOF(LJ,12) = - TCOF(LJ,11) - TCOF(LJ,13)

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TCOF(LJ,24) = (1.-TREPS)*((T(1,ISLICE,LJ)-T(1,ISLICE,LOUT)) + NTARAYT 4681
Z      (T(1,ISLICE,LJ)-T(1,ISLICE,L)) *TCOF(LJ,13)/TREPS) NTARAYT 4682
C NTARAYT 4683
C NTARAYT 4684
C FOR MID-METAL NODE: NTARAYT 4685
C NTARAYT 4686
THETA1 = (DX1+DX2+DX5+DX6)/(DX1+DX2+DX9+DX10) NTARAYT 4687
THETA2 = ((TAU(L)+TAU(LUP))/(2.*DX1))*2.*TAU(L)/(DX1+DX2+DX9+DX10) NTARAYT 4688
THETA3 = 0.0 NTARAYT 4689
THETA6 = 24.*TAU(L)/(AKW(ISLICE,IS)*S(ISLICE)*(DX1+DX2+DX9+DX10)) NTARAYT 4690
IF (IS.LT.NSTA-1) THETA3 = ((TAU(L)+TAU(LDN))/(2.*DX2))*2.* NTARAYT 4691
Z      TAU(L)/(DX1+DX2+DX9+DX10) NTARAYT 4692
THETA4 = 0.0 NTARAYT 4693
THETA5 = 0.0 NTARAYT 4694
HUB1 = 0.0 NTARAYT 4695
HUB3 = 0.0 NTARAYT 4696
TIP1 = 0.0 NTARAYT 4697
TIP3 = 0.0 NTARAYT 4698
IF (ISLICE.EQ.1) GO TO 3410 NTARAYT 4699
C NTARAYT 4700
C FOR A SLICE THAT IS NOT AT THE HUB OF THE BLADE: NTARAYT 4701
C NTARAYT 4702
THETA4 = (TAU(L)/S(ISLICE))* (TAU(L)/(S(ISLICE)+S(ISLICE-1))) * NTARAYT 4703
Z      2.*(DX1+DX2)/(DX1+DX2+DX9+DX10) NTARAYT 4704
IF (ISLICE.EQ.NSLICE) GO TO 3412 NTARAYT 4705
THETA5 = THETA4*(S(ISLICE)+S(ISLICE-1))/(S(ISLICE)+S(ISLICE+1)) NTARAYT 4706
TBELOW = T(1,ISLICE-1,L) NTARAYT 4707
TABOVE = T(1,ISLICE+1,L) NTARAYT 4708
GO TO 3414 NTARAYT 4709
C NTARAYT 4710
C FOR THE SLICE AT THE HUB END OF THE BLADE: NTARAYT 4711
C NTARAYT 4712
3410 CONTINUE NTARAYT 4713
IF (IHUB.EQ.1) HUB1 = ((DX1+DX2)/(DX1+DX2+DX9+DX10))* (2.*(TAU(L)/ NTARAYT 4714
Z      S(1)**2) NTARAYT 4715
C FOR IHUB = 1, HUB TEMPERATURE IS SPECIFIED***** NTARAYT 4716
C NTARAYT 4717
THETA5 = 0.0 NTARAYT 4718
IF (NSLICE.GT.1) THETA5 = (TAU(L)/S(1))* (TAU(L)/(S(1)+S(2))) * NTARAYT 4719
Z      (2.*(DX1+DX2)/(DX1+DX2+DX9+DX10)) NTARAYT 4720
C NTARAYT 4721
IF (IHUB.EQ.3) HUB3 = ((DX1+DX2)/(DX1+DX2+DX9+DX10))* (TAU(L)**2)/ NTARAYT 4722
Z      (AKW(1,IS)*12.*S(1)) NTARAYT 4723
C IHUB = 3, THE HEAT FLUX AT THE HUB END IS SPECIFIED (BTU/HR FT**2) *** NTARAYT 4724
C NTARAYT 4725
TBELOW = T(1,1,L) NTARAYT 4726
IF (IHUB.EQ.1) TBELOW = THUB(IS) NTARAYT 4727
C NTARAYT 4728
TABOVE = T(1,1,L) NTARAYT 4729
IF (NSLICE.GT.1) TABOVE = T(1,2,L) NTARAYT 4730
C NTARAYT 4731
IF (NSLICE.GT.1) GO TO 3414 NTARAYT 4732
C NTARAYT 4733
C FOR THE SLICE AT THE BLADE TIP, (IF THERE ARE MORE THAN 1 SLICES NTARAYT 4734
C BEING CONSIDERED) : ***** NTARAYT 4735
C NTARAYT 4736
3412 CONTINUE NTARAYT 4737
IF (ITIP.EQ.1) TIP1 = ((DX1+DX2)/(DX1+DX2+DX9+DX10))* (2.*(TAU(L)/ NTARAYT 4738
Z      S(NSLICE)**2) NTARAYT 4739
IF (NSLICE.GT.1) TBELOW = T(1,ISLICE-1,L) NTARAYT 4740

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      IF (ITIP.EQ.3) TIP3 = ((DX1+DX2)/(DX1+DX2+DX9+DX10))*(TAU(L)**2)/
Z      (AKW(NSLICE,IS)*12.*S(NSLICE))
      TABOVE = T(1,ISLICE,L)
      IF (ITIP.EQ.1) TABOVE = TTIP(IS)
C
3414  CONTINUE
      THETA9 = 0.0
      IF (DLTYME.GT.0.0.AND.TYME.GE.0.) THETA9 = 2.*3600.*RHOM*SPHTM*
Z      (DX1+DX2)*(TAU(L)**2)/(144.*AKW(ISLICE,IS)*
Z      (DX1+DX2+DX9+DX10)*DLTYME)
C
C
C  ENDEFF IS EFFECT OF HEAT TRANSFER FROM THE GAS TO THE REAR EDGE OF
C  THE BLADE
C
      ENDEFF = 0.0
      ENDFLX = 0.0
      IF (IS.GE.NSTA-1.AND.BTA.EQ.0.0) ENDEFF = 2.*HG(IS)*(TAU(L)**2)/
Z      (12.*AKW(ISLICE,IS)*(DX1+DX9))
      IF (IS.GE.NSTA-1.AND.BTA.GT.0.0) ENDFLX = QG(IS)*(TAU(L)**2)/
Z      (12.*AKW(ISLICE,IS)*(DX1+DX9))
3416  CONTINUE
      TCOF(L,11) = 1.0*TREPS
      TCOF(L,13) = THETA1*TREPS
      TCOF(L,J1) = THETA2*TREPS
      TCOF(L,J2) = 0.0
      TCOF(L,12) = (-1.0 - THETA1 - THETA2 - THETA3 - THETA4 - THETA5
Z      - ENDEFF - HUB1 - TIP1)*TREPS - THETA9
      TCOF(L,24) = QSNK(IS)*THETA6 - (THETA4+HUB1)*TBELOW -
Z      (THETA5+TIP1)*TABOVE - QHUB(IS)*HUB3 + QTIP(IS)*TIP3
Z      - (1.-TREPS)*(T(1,ISLICE,LUP)*THETA2+T(1,ISLICE,LJ) +
Z      T(1,ISLICE,LIN)*THETA1+T(1,ISLICE,LDN)*THETA3)
Z      +T(1,ISLICE,L)*((1.0-TREPS)*(1.+THETA1+THETA2+THETA3+
Z      THETA4+THETA5+HUB1+TIP1+ENDEFF)
Z      - THETA9) - TG(IS)*ENDEFF - ENDFLX
      IF (IS.LT.NSTA-1) TCOF(L,J2) = THETA3*TREPS
C
      PUMP(IS) = (.1047198*WS)**2*RR(IS)*(RR(IS)-RR(IS-2))
C
C  FOR INNER SURFACE NODE:
C
342   THETA8 = 2.*HX*HC(IS)*AHTRN1*TAU(L)/(12.*AKW(ISLICE,IS)*
Z      S(ISLICE)*(DX1+DX2+DX5+DX6))
C
      TCOF(LIN,11) = TREPS
      TCOF(LIN,12) = (-1.0 - THETA8)*TREPS
      TCOF(LIN,13) = THETA8*(YCONV + YFINS)*TREPS
      TCOF(LIN,24) = - YIMP*THETA8*T0G
Z      - (1.-TREPS)*(T(1,ISLICE,L)-T(1,ISLICE,LIN))*(1.+THETA8)
Z      +THETA8*(YCONV+YFINS)*T(1,ISLICE,LCOOL))
C
C  IF THIS IS A TRAILING EDGE, PRESSURE SIDE, STATION, COOLANT NODE
C  COINCIDES WITH SUCTION SIDE COOLANT NODE.
      IF (ISENS.EQ.0) GO TO 343
      TCOF(LCOOL,7) = -1.0
      TCOF(LCOOL,12) = 1.0
      TCOF(LCOOL,24) = 0.0
      IF (ISENS.EQ.1) GO TO 430
343   CONTINUE
C

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NTARAYT 4741
 NTARAYT 4742
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 NTARAYT 4791
 NTARAYT 4792
 NTARAYT 4793
 NTARAYT 4794
 NTARAYT 4795
 NTARAYT 4796
 NTARAYT 4797
 NTARAYT 4798
 NTARAYT 4799
 NTARAYT 4800

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C FOR COOLANT NODE:
C FOR THE SPECIAL CASE OF IS = NFWD+1, GO TO 350
C
FILMW = WFC(IS)
IF (IS.GT.NFWD) FILMW = FILMW + WFC(IS+1)
IF (IS.EQ.NFWD+1) GO TO 350
C
C
WXCP = WCROS(2,ISLICE,IS)*144.*CPC(IS)*3600.
IF (IS.EQ.ICOMP.OR.IS.EQ.ICOMS) WXCP = WJ(ISLICE,JS)*144.*
Z CPC(IS)*3600./2.
C
C
C DEFINE A COOLANT SIDE TRANSIENT TERM, TRTRMG
C
TRTRMG = 0.0
IF (DLTYME.GT.0.0.AND.TYME.GE.0.) TRTRMG = (1.+CPC(IS-2)/CPC(IS))*
Z (P(1,ISLICE,IS-2)/T(1,ISLICE,LCUP)
Z - P(1,ISLICE,IS)/T(1,ISLICE,LCOOL))
Z * (A(LCUP)+A(LCOOL))*DLX(LCOOL)/(16.*DLTYME*R*
Z WCROS(2,ISLICE,IS)*12.)
TCOF(LCOOL,J4) = HX*TREPS*HC(ISUP)*A1/WXCP
TCOF(LCOOL,J5) = 144.*3600.*TREPS*WCROS(2,ISLICE,ISUP)*
Z (1.+AM2(ISUP)*(GAMC(ISUP)-1.)/2.)*CPC(ISUP)/WXCP
Z - HX*TREPS*HC(ISUP)*(YCONVU+YFINSU)*(A1+A3)/WXCP - TRTRMG
TCOF(LCOOL,11) = HX*TREPS*HC(IS)*A2/WXCP
TCOF(LCOOL,12) = TREPS*((-FILMW*144.*3600.*CPC(IS)/WXCP)-1.0
Z - ((GAMC(IS)-1.)/2.)*AM2(IS)
Z - HX*HC(IS)*(A2 + A4)*(YCONV+YFINS)/WXCP) - TRTRMG
TREDGE = 0.0
IF (IS.GT.NFWD) TREDGE= ((1.-TREPS)*HX/WXCP)*(T(1,ISLICE,LCUP)*
Z HC(ISUP)*A3 + T(1,ISLICE,LCOOL)*HC(IS)*A4)
TCOF(LCOOL,24) = -(CPO*FACTOR*WJ(ISLICE,ISUP)*144.*3600./WXCP)*TOG
Z - PUMP(IS)/(CPC(IS)*778.*144.*32.2)
Z + TOG*(HX*HC(ISUP)*A1*YIMPU + HX*HC(IS)*A2*YIMP)/WXCP
Z - T(1,ISLICE,LCUPS)*HX*(1-TREPS)*HC(ISUP)*A1/WXCP
Z - T(1,ISLICE,LCUP)*(144.*3600.*(1.-TREPS)*WCROS(2,ISLICE,ISUP)
Z *(1.+AM2(ISUP)*(GAMC(ISUP)-1.)/2.)*CPC(ISUP)/
Z WXCP - HX*(1.-TREPS)*HC(ISUP)*(YCONVU+
Z YFINSU)*(A1+A3)/WXCP - TRTRMG)
Z - T(1,ISLICE,LIN)*HX*(1.-TREPS)*HC(IS)*A2/WXCP
Z - T(1,ISLICE,LCOOL)*((1.-TREPS)*((-FILMW*144.*3600.*CPC(IS)/
Z WXCP)-1.0-((GAMC(IS)-1.)/2.)*AM2(IS)
Z - HX*HC(IS)*(A2 + A4)*(YCONV+YFINS)/WXCP) - TRTRMG) - TREDGE
IF (IS.GT.NFWD) TCOF(LCOOL,J6) = TREPS*HX*HC(ISUP)*A3/WXCP
IF (IS.GT.NFWD) TCOF(LCOOL,J8) = TREPS*HX*HC(IS)*A4/WXCP
C
C*** OF THE TERMS YIMP,YFINS,YCONV, ONLY ONE CAN BE NON-ZERO AT A TIME
C YIMP = 1.0 MEANS THAT IMPINGEMENT HEAT TRANSFER IS BEING CONSIDERED
C YFINS = 1.0 MEANS THAT A PIN FINNED SURFACE IS BEING USED
C YCONV = 1.0 MEANS A FORCED CONVECTION CORRELATION IS BEING USED
C
C
IF (TYME.GT.0.) RCHRD = (144./3600.)*AKW(ISLICE,IS)*DLTYME/
Z (RHOM*SPHTM*((DX1+DX2)/2.))**2)
IF (TYME.GT.0.) RTRNV = (144./3600.)*AKW(ISLICE,IS)*DLTYME/
Z (RHOM*SPHTM*(TAU(L))**2)
IF (RCHRD.GT.RCHRDM) RCHRDM = RCHRD
IF (RTRNV.GT.RTRNVDM) RTRNVDM = RTRNV
GO TO 430

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NTARAYT 4801
NTARAYT 4802
NTARAYT 4803
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NTARAYT 4856
NTARAYT 4857
NTARAYT 4858
NTARAYT 4859
NTARAYT 4860

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350  CONTINUE
C
C  FOR MIXING ZONE; STATION NO. NFWD+1:
C
      IF (IHC(IS).EQ.3) CALL HCPINS (IS,DELTAN,LCOOL,LCUP,LIN,LCOOLP,PINS,NTARAYT 4861
Z      ,EFAREA)
      AHTRN1 = EFAREA (IS)
      IF (IHC(IS).EQ.3) A2 = EFAREA (IS) /2.
      A3 = SPAN*DLX (LCOOLP) /2.
      IF (IHC (IS-1).EQ.3) A3 = EFAREA (IS-1) /2.
      A4 = SPAN*DLX (LCOOLP) /2.
      IF (IHC (IS).EQ.3) A4 = EFAREA (IS+1) /2.
      IF (IHC (IS).EQ.3) GO TO 360
C
      IF (IHC (IS).EQ.2) HC (IS) = HCFRCD (IS,LCOOL,LIN)
      AHTRN1 = (DX5+DX6)*S (ISLICE) /2.
360  CONTINUE
C
      IF (IHC (IS-1).EQ.1) YIMPUU = 1.0
      IF (IHC (IS-1).EQ.2) YCNVUU=1.0+RCVRY*AM2 (IS-1)*(GAMC (IS-1)-1.) /2.
      IF (IHC (IS-1).EQ.3) YFNSUU = 1.0
C
      WCXCP = WCROS (2,ISLICE,IS)*144.*CPC (IS)*3600.
      RHOBAR = ((P (1,ISLICE,IS-2)+P (1,ISLICE,IS)) /24.)*(1./R)*2.*
Z      WCROS (2,ISLICE,IS) /
Z      (T (1,ISLICE,LCUPP+1)*WCROS (2,ISLICE,IS-1) + T (1,ISLICE,LCUP) *
Z      WCROS (2,ISLICE,IS-2)
Z      + TOG*WDUMP + T (1,ISLICE,LCOOL)*WCROS (2,ISLICE,IS))
      VOLBAR = (A (LCUP)+A (LCUPP+1)+A (LCOOL))*(DLX (LCOOLP)+DLX (LIN)) /4.
      TRTRMJ = 0.0
      IF (DLTYME.GT.0.0.AND.TYME.GE.0.) TRTRMJ = RHOBAR*VOLBAR/
Z      (2.*DLTYME*(WCROS (2,ISLICE,IS)**2))
      TCOF (LCOOL,1) = TREPS*HX*HC (IS-2)*A1/WXCP
      TCOF (LCOOL,2) = TREPS*((WCROS (2,ISLICE,ISUP)/WCROS (2,ISLICE,IS))
Z      *(1.+AM2 (ISUP)*(GAMC (ISUP)-1.) /2.)*(CPC (ISUP) /
Z      CPC (IS)) - HX*HC (ISUP)*(YCONVU+YFINSU)*(A1)/WXCP)
Z      - TRTRMJ*WCROS (2,ISLICE,IS-2)
      TCOF (LCOOL,6) = TREPS*HX*HC (IS-1)*A3/WXCP
      TCOF (LCOOL,7) = TREPS*((WCROS (2,ISLICE,IS-1)/WCROS (2,ISLICE,IS))*
Z      (1.+AM2 (IS-1)*(GAMC (IS-1)-1.) /2.)*(CPC (IS-1) /
Z      CPC (IS)) - HX*HC (IS-1)*(YCNVUU+YFNSUU)*(A3)/WXCP)
Z      - TRTRMJ*WCROS (2,ISLICE,IS-1)
      TCOF (LCOOL,11) = TREPS*HX*HC (IS)*A2/WXCP
      TCOF (LCOOL,12) = TREPS*((-FILMW/WCROS (2,ISLICE,IS))-1.0-((GAMC (IS)
Z      -1.) /2.)*AM2 (IS)-HX*HC (IS)*(A2+A4)*(YCONV+YFINS)
Z      /WXCP) - TRTRMJ*WCROS (2,ISLICE,IS)
      TCOF (LCOOL,16) = TREPS*HX*HC (IS)*A4/WXCP
      TCOF (LCOOL,24) = TOG*(HX*HC (IS-2)*A1*YIMPU + HX*HC (IS)*(A2+A4)*
Z      YIMP + HX*HC (IS-1)*A3*YIMPUU)/WXCP
Z      -PUMP (IS) / (CPC (IS)*778.*144.*32.2) - (CPO/CPC (IS))*TOG*
Z      (WJ (ISLICE,IS-2)+WJ (ISLICE,IS-1)+WDUMP) /WCROS (2,ISLICE,IS)
Z      -T (1,ISLICE,LCUPS)*(1.-TREPS)*HX*HC (IS-2)*A1/WXCP
Z      -T (1,ISLICE,LCUP)*((1.-TREPS)*((WCROS (2,ISLICE,ISUP) /
Z      WCROS (2,ISLICE,IS))*(1.+AM2 (ISUP)*(GAMC (ISUP)-1.) /2.))
Z      *(CPC (ISUP)/CPC (IS)) - HX*HC (ISUP)*(YCONVU+YFINSU)
Z      *(A1)/WXCP) + TRTRMJ*WCROS (2,ISLICE,IS-2))
Z      -T (1,ISLICE,LCUPP)*(1.-TREPS)*HX*HC (IS-1)*A3/WXCP
Z      -T (1,ISLICE,LCUPP+1)*((1.-TREPS)*((WCROS (2,ISLICE,IS-1) /
Z      WCROS (2,ISLICE,IS))*(1.+AM2 (IS-1)*(GAMC (IS-1)-1.) /2.))
Z      *(CPC (IS-1)/CPC (IS)) - HX*HC (IS-1)*(YCNVUU+YFNSUU)*(A3) /
NTARAYT 4862
NTARAYT 4863
NTARAYT 4864
NTARAYT 4865
NTARAYT 4866
NTARAYT 4867
NTARAYT 4868
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NTARAYT 4920

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Z	WXCP) + TRTRMJ*WCROS(2,ISLICE,IS-1))	NTARAYT 4921
Z	-T(1,ISLICE,LIN)*(1.-TREPS)*HX*HC(IS)*A2/WXCP	NTARAYT 4922
Z	-T(1,ISLICE,LCOOL)*(1.-TREPS)*((-FILMW/WCROS(2,ISLICE,IS))-1.0	NTARAYT 4923
Z	-((GAMC(IS)-1.)/2.)*AM2(IS)	NTARAYT 4924
Z	- HX*HC(IS)*(A2+A4)*(YCONV+YFINS)/WXCP	NTARAYT 4925
Z	- T(1,ISLICE,LCOOL)*TRTRMJ*WCROS(2,ISLICE,IS)	NTARAYT 4926
Z	-T(1,ISLICE,LCOOLP)*(1.-TREPS)*HX*HC(IS)*A4/WXCP	NTARAYT 4927
C	GO TO 430	NTARAYT 4928
C		NTARAYT 4929
C		NTARAYT 4930
C		NTARAYT 4931
C		NTARAYT 4932
C		NTARAYT 4933
C		NTARAYT 4934
C		NTARAYT 4935
C		NTARAYT 4936
C		NTARAYT 4937
C		NTARAYT 4938
C	*****	NTARAYT 4939
C	*****	NTARAYT 4940
C	***** THIS BLOCK SETS UP TCOF ELEMENTS FOR STATIONS THAT ARE FORWARD	NTARAYT 4941
C	OF THE FLOW SPLIT POINT,	NTARAYT 4942
C	***** AND ARE ON THE SAME SIDE OF THE BLADE AS THE FLOW SPLIT POINT	NTARAYT 4943
C	*****	NTARAYT 4944
C	*****	NTARAYT 4945
C		NTARAYT 4946
370	CONTINUE	NTARAYT 4947
	ISUP = IS + 2	NTARAYT 4948
	LCUP = LCOOL + 10	NTARAYT 4949
	LCUPS = LCOOL + 9	NTARAYT 4950
	LUP = LCOOL + 8	NTARAYT 4951
	LDN = LCOOL - 12	NTARAYT 4952
	IF (IS.EQ.2) LDN = 3	NTARAYT 4953
	IF (IS.EQ.1) LDN = 8	NTARAYT 4954
	IF (IHC(ISUP).EQ.1) YIMPU = 1.0	NTARAYT 4955
	IF (IHC(ISUP).EQ.2) YCONVU=1.0+RCVRY*AM2(ISUP)*(GAMC(ISUP)-1.)/2.	NTARAYT 4956
	IF (IHC(ISUP).EQ.3) YFINSU = 1.0	NTARAYT 4957
	DX1 = DLX(LUP)	NTARAYT 4958
	DX2 = DLX(L)	NTARAYT 4959
	DX3 = DLX(LUP-2)	NTARAYT 4960
	DX4 = DLX(LOUT)	NTARAYT 4961
	DX5 = DLX(LCUPS)	NTARAYT 4962
	DX6 = DLX(LIN)	NTARAYT 4963
	DX7 = DLX(LCUP)	NTARAYT 4964
	DX9 = DLX(LUP-1)	NTARAYT 4965
	DX10 = DLX(LJ)	NTARAYT 4966
	IF (IS.GT.1) GO TO 332	NTARAYT 4967
C		NTARAYT 4968
	DX2 = DLX(8)	NTARAYT 4969
	DX4 = DLX(6)	NTARAYT 4970
	DX6 = DLX(9)	NTARAYT 4971
	DX10 = DLX(7)	NTARAYT 4972
	J1 = 22	NTARAYT 4973
	J2 = 17	NTARAYT 4974
	J4 = 21	NTARAYT 4975
	J5 = 22	NTARAYT 4976
	J6 = 8	NTARAYT 4977
	J8 = 15	NTARAYT 4978
	GO TO 333	NTARAYT 4979
C		NTARAYT 4980

C		NTARAYT 4981
C		NTARAYT 4982
C		NTARAYT 4983
C		NTARAYT 4984
C		NTARAYT 4985
C		NTARAYT 4986
C		NTARAYT 4987
C	*****	NTARAYT 4988
C	*****	NTARAYT 4989
C	***** SETUP FOR TRAILING EDGE REGION:	NTARAYT 4990
C	*****	NTARAYT 4991
C	*****	NTARAYT 4992
380	CONTINUE	NTARAYT 4993
	ISENS = IS - 2*(IS/2)	NTARAYT 4994
C		NTARAYT 4995
C	ISENS = 0 MEANS IS IS EVEN AND STATION IS ON SUCTION SIDE	NTARAYT 4996
C	ISENS = 1 MEANS IS IS ODD AND STATION IS ON PRESSURE SIDE	NTARAYT 4997
C		NTARAYT 4998
	LCOOL = 5*IS	NTARAYT 4999
	LIN = LCOOL - 1	NTARAYT 5000
	L = LCOOL - 2	NTARAYT 5001
	LJ = LCOOL - 3	NTARAYT 5002
	LOUT = LCOOL - 4	NTARAYT 5003
	LUP = L - 10	NTARAYT 5004
	LDN = L + 10	NTARAYT 5005
	LCUP = LCOOL - 10	NTARAYT 5006
	LCUPS = LCUP - 1	NTARAYT 5007
	LCUPP = LCOOL - 6	NTARAYT 5008
	LCOOLP = LCOOL + 4	NTARAYT 5009
C		NTARAYT 5010
C		NTARAYT 5011
	I3 = 12 - LIN + LCOOL	NTARAYT 5012
	J1 = 12 - L + LUP	NTARAYT 5013
	J2 = 12 - L + LDN	NTARAYT 5014
	J4 = 12 - LCOOL + LCUPS	NTARAYT 5015
	J5 = 12 - LCOOL + LCUP	NTARAYT 5016
	J6 = 12 - LCOOL + LCUPP	NTARAYT 5017
	J8 = 12 - LCOOL + LCOOLP	NTARAYT 5018
	J9 = 16	NTARAYT 5019
C		NTARAYT 5020
	A1 = SPAN*DLX(LIN)/2.	NTARAYT 5021
	A2 = A1	NTARAYT 5022
	A3 = SPAN*DLX(LCOOLP)/2.	NTARAYT 5023
	A4 = A3	NTARAYT 5024
	IF (IHC(IS-2).EQ.3) A1 = EFAREA(IS-2)/2.	NTARAYT 5025
	IF (IHC(IS-2).EQ.3) A3 = EFAREA(IS-1)/2.	NTARAYT 5026
	DX1 = DLX(L)	NTARAYT 5027
	DX2 = DLX(LDN)	NTARAYT 5028
	DX3 = DLX(LOUT)	NTARAYT 5029
	DX4 = DLX(LDN-2)	NTARAYT 5030
	DX5 = DLX(LIN)	NTARAYT 5031
	DX6 = DLX(LDN+1)	NTARAYT 5032
	DX7 = DLX(LCOOL)	NTARAYT 5033
	DX9 = DLX(LJ)	NTARAYT 5034
	DX10 = DLX(LDN-1)	NTARAYT 5035
C		NTARAYT 5036
	IF (IHC(ISUP).EQ.1) YIMPU = 1.0	NTARAYT 5037
	IF (IHC(ISUP).EQ.2) YCONVU = 1.0 + RCVRY*AM2(ISUP)*(GAMC(ISUP) - 1.)/2.	NTARAYT 5038
	IF (IHC(ISUP).EQ.3) YFINSU = 1.0	NTARAYT 5039
C		NTARAYT 5040

IF (IS.LT.NSTA-1) GO TO 390	NTARAYT 5041
C	NTARAYT 5042
C FOR THE LAST STATIONS IN THE TRAILING EDGE:	NTARAYT 5043
C	NTARAYT 5044
DX2 = 0.0	NTARAYT 5045
DX4 = 0.0	NTARAYT 5046
DX6 = 0.0	NTARAYT 5047
DX10 = 0.0	NTARAYT 5048
390 CONTINUE	NTARAYT 5049
IF (IHC(IS).EQ.3) GO TO 420	NTARAYT 5050
IF (IHC(IS).EQ.2) GO TO 410	NTARAYT 5051
GO TO 340	NTARAYT 5052
C	NTARAYT 5053
C*** HCFRCD COMPUTES HC FOR FORCED CONVECTION	NTARAYT 5054
C	NTARAYT 5055
410 CONTINUE	NTARAYT 5056
TMP = (T(2,ISLICE,LCOOL) + T(2,ISLICE,LIN))/2.	NTARAYT 5057
CALL GASTBL(TMP,C,CP,GAM,PD,R,XMU)	NTARAYT 5058
RE(IS) = 12.*3600.*ABS(WCROS(2,ISLICE,IS))*DH(IS)/(A(LCOOL)*XMU)	NTARAYT 5059
C	NTARAYT 5060
HC(IS) = .023*12.*(C/DH(IS))*(RE(IS)**.8)*(PD**.333)	NTARAYT 5061
AHTRN1 = (DX5 + DX6)*SPAN/2.	NTARAYT 5062
GO TO 340	NTARAYT 5063
C	NTARAYT 5064
C***** SUBROUTINE HCPINS COMPUTES HC FOR A PIN FIN SURFACE OR FOR	NTARAYT 5065
C TURBULENT FORCED CONVECTION CHANNEL FLOW	NTARAYT 5066
420 CONTINUE	NTARAYT 5067
IF(ISENS.EQ.0) GO TO 424	NTARAYT 5068
AHTRN1 = EFAREA(IS)	NTARAYT 5069
HC(IS) = HC(IS-1)	NTARAYT 5070
GO TO 340	NTARAYT 5071
C	NTARAYT 5072
424 CALL HCPINS(IS,DELTAN,LCOOL,LCUP,LIN,LCOOLP,PINS,EFAREA)	NTARAYT 5073
AHTRN1 = EFAREA(IS)	NTARAYT 5074
IF (IS.GE.NSTA-1) AHTRN1 = AHTRN1/2.	NTARAYT 5075
A2 = EFAREA(IS)/2.	NTARAYT 5076
A4 = EFAREA(IS+1)/2.	NTARAYT 5077
GO TO 340	NTARAYT 5078
C	NTARAYT 5079
C	NTARAYT 5080
C	NTARAYT 5081
C	NTARAYT 5082
430 CONTINUE	NTARAYT 5083
440 CONTINUE	NTARAYT 5084
450 CONTINUE	NTARAYT 5085
C	NTARAYT 5086
RETURN	NTARAYT 5087
END	NTARAYT 5088
C----	
SOURCE.NTCOFTT	NTCOFTT 5089
SUBROUTINE TCOEF(IWRITE,WS,NIT,IPLT,ALPH2)	NTCOFTT 5090
C	NTCOFTT 5091
C- SOURCE.NTCOFTT	NTCOFTT 5092
C	NTCOFTT 5093
DIMENSION POLD(15,80), PSAV(5), X(80), ALPH2(4), DELTAN(15),	NTCOFTT 5094
Z TTOTC(80), JSO(15)	NTCOFTT 5095
DIMENSION PEXOLD(15), PIMOLD(15)	NTCOFTT 5096
REAL*8 TCOF	NTCOFTT 5097
COMMON /MATRX/ TCOF(400,30)	NTCOFTT 5098
C	NTCOFTT 5099
COMMON /PRPS/ CPO, GAMO, DP(80), SP(80), RE(80),	NTCOFTT 5100

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Z          CPC (80) ,   GAMC (80) ,   DUMR1 (80) ,   DUMR2 (80)          NTCOFTT 5101
C          NTCOFTT 5102
C          COMMON /TCO/ ADUMP,      BTA,      CD,      CP,          NTCOFTT 5103
Z          GAM,      PIM,      R,      SPAN,      TOG,          NTCOFTT 5104
Z          WDUMP,      WIM,      AKC (15,80) ,   AKW (15,80) ,   NTCOFTT 5105
Z          A (400) ,   AJET (80) ,   AM2 (80) ,   CNUM (80) ,   NTCOFTT 5106
Z          DH (80) ,   DHF (80) ,   DHJ (80) ,   NTCOFTT 5107
Z          DLX (400) ,   FF (80) ,   HC (80) ,   HG (80) ,   NTCOFTT 5108
Z          P (2,15,80) ,   PEXIT (15) ,   PUMP (80) ,   QG (80) ,   NTCOFTT 5109
Z          QSNK (80) ,   RR (80) ,   S (15) ,   T (2,15,400) ,   NTCOFTT 5110
Z          TG (80) ,   TAU (400) ,   WFC (80) ,   NTCOFTT 5111
Z          WJ (15,80) ,   WCROS (2,15,80) ,   XN (80) ,   NTCOFTT 5112
Z          ICOR,      IFILM,      IHUB,      ITIP,      NTCOFTT 5113
Z          ISBLOK,      ISLICE,      NBLKSZ,      NSLICE,      NTCOFTT 5114
Z          NFW D,      NSTA,      IHC (80)          NTCOFTT 5115
C          NTCOFTT 5116
C          COMMON /TRNSNT/ RHOC,      RHOM,      SPHTC,      SPHTM,      NTCOFTT 5117
Z          DLT YME,      TYME,      TEPS,      TYMMAX          NTCOFTT 5118
C          NTCOFTT 5119
C          NTCOFTT 5120
C          NTCOFTT 5121
C          NTCOFTT 5122
C          NTCOFTT 5123
C          NTCOFTT 5124
C          NTCOFTT 5125
C          NTCOFTT 5126
C          NTCOFTT 5127
C          NTCOFTT 5128
C          NTCOFTT 5129
C          NTCOFTT 5130
C          1. INDICATES THAT A HEAT FLUX IS SPECIFIED ON THE GAS BOUNDARY NTCOFTT 5131
C          UNITS EXPECTED ON THE FOLLOWING INPUT DATA ARE: NTCOFTT 5132
C          LENGTHS ARE ALL IN INCHES-- DLX, TAU, SPAN, DH, DPX NTCOFTT 5133
C          TEMPERATURES ARE ABSOLUTE (R) NTCOFTT 5134
C          MASS FLOWS ARE ALL IN (LBM/SEC) ,--- WCROS, WJ, WFC, WDUMP NTCOFTT 5135
C          HEAT TRANSFER COEFFICIENTS ARE IN BTU/(HR*FT**2*R) ,--HG,HC--GAS NTCOFTT 5136
C          SIDE AND COOLANT SIDE . NTCOFTT 5137
C          HEAT FLUX QG IS IN BTU/(HR*FT**2) NTCOFTT 5138
C          HEAT SINK, QSNK, IS IN BTU/(HR) NTCOFTT 5139
C          THERMAL PROPERTIES ARE: CONDUCTIVITY-AKW-BTU/(HR*FT*R) NTCOFTT 5140
C          HEAT CAPACITY-CP-BTU/(LBM*R) NTCOFTT 5141
C          NTCOFTT 5142
C          NTCOFTT 5143
C          NTCOFTT 5144
C-----SET UP FIRST GUESS AT TEMPERATURE DISTRIBUTION NTCOFTT 5145
C-----ASSUME COOLANT TEMPERATURE IS CONSTANT, = PLENUM STATIC TEMPERATURE NTCOFTT 5146
C-----ASSUME METAL TEMPERATURE IS CONSTANT, = 2200. R NTCOFTT 5147
C          NTCOFTT 5148
100  CONTINUE NTCOFTT 5149
      NODST = 5*NSTA NTCOFTT 5150
      N = NSTA - 1 NTCOFTT 5151
      V = .70 NTCOFTT 5152
      NSAVE = NODST-10 NTCOFTT 5153
      TSAVE = T (2,ISLICE,NSAVE) NTCOFTT 5154
C          NTCOFTT 5155
C          NODST = NODE NUMBER OF LAST FLOW CHANNEL NODE,AT EXIT OF TRAILING EDGNTCOFTT 5156
C          NTCOFTT 5157
110  TMP = TOG NTCOFTT 5158
      NODSF = 5*NFW D NTCOFTT 5159
120  CONTINUE NTCOFTT 5160
C

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C-- FOR TRANSIENT CASES, ADJUST INITIAL GUESS OF PRESSURE DISTRIBUTION	NTCOFTT 5161
C-- BASED ON THE VARIATION OF SUPPLY AND EXIT PRESSURES.	NTCOFTT 5162
C	NTCOFTT 5163
IF (TYME.GT.0.0) GO TO 234	NTCOFTT 5164
C	NTCOFTT 5165
C-- FOR STEADY STATE, ONLY INITIALIZE P'S ON FIRST OVERALL LOOP.	NTCOFTT 5166
C	NTCOFTT 5167
IF (NIT.GT.1) GO TO 255	NTCOFTT 5168
PEXOLD(ISLICE) = PEXIT(ISLICE)	NTCOFTT 5169
PIMOLD(ISLICE) = PIM	NTCOFTT 5170
160 WRITE(6,165) (I,T(1,ISLICE,I),I=1,NODST)	NTCOFTT 5171
165 FORMAT(1H1,' ASSUMED INITIAL TEMPERATURE DISTRIBUTION, (NODE NO.',	NTCOFTT 5172
Z ' ',T) '/7(' (' ,I3,',',F8.2,',')')	NTCOFTT 5173
170 CONTINUE	NTCOFTT 5174
C	NTCOFTT 5175
C----PRESSURE INITIALIZATION, GIVEN PIM (PLENUM STATIC PRESSURE) AND	NTCOFTT 5176
C----PEXIT (GAS SIDE STATIC PRESSURE AT TRAILING EDGE), FIT PRESSURE TO	NTCOFTT 5177
C A	NTCOFTT 5178
C----CUBIC EQN. OF THE FORM A+B*X**3, ASSUMING 85% OF THE PRESSURE DROP	NTCOFTT 5179
C----OCCURS IN THE TRAILING EDGE CHANNEL	NTCOFTT 5180
C	NTCOFTT 5181
X(1) = 0.0	NTCOFTT 5182
X(2) = DLX(10)	NTCOFTT 5183
DO 180 I = 3,NFWD	NTCOFTT 5184
X(I) = DLX(5*I) + X(I-2)	NTCOFTT 5185
180 CONTINUE	NTCOFTT 5186
P(1,ISLICE,1) = PIM - (PIM-PEXIT(ISLICE))* .15	NTCOFTT 5167
P(1,ISLICE,N) = PEXIT(ISLICE)	NTCOFTT 5188
P(1,ISLICE,N+1) = P(1,ISLICE,N)	NTCOFTT 5189
P(1,ISLICE,NFWD-1) = P(1,ISLICE,1) - .2*(P(1,ISLICE,1) - PEXIT(ISLICE))	NTCOFTT 5190
190 P(1,ISLICE,NFWD) = P(1,ISLICE,NFWD-1)	NTCOFTT 5191
DO 200 I = 3,NFWD,2	NTCOFTT 5192
P(1,ISLICE,I) = P(1,ISLICE,1) - (P(1,ISLICE,1) - P(1,ISLICE,NFWD)) *	NTCOFTT 5193
Z (X(I)/X(NFWD))**3	NTCOFTT 5194
200 P(1,ISLICE,I-1) = P(1,ISLICE,1) - (P(1,ISLICE,1) - P(1,ISLICE,NFWD-1)) *	NTCOFTT 5195
Z (X(I-1)/X(NFWD-1))**3	NTCOFTT 5196
ISTRT = NFWD+1	NTCOFTT 5197
IFNL = N	NTCOFTT 5198
C	NTCOFTT 5199
C----FOR TRAILING EDGE CHANNEL, X VALUES ARE RELATIVE TO END OF	NTCOFTT 5200
C IMPINGEMENT CHANNEL	NTCOFTT 5201
C	NTCOFTT 5202
X(NFWD+1) = (DLX(NODSF) + DLX(NODSF-5))/2.	NTCOFTT 5203
210 ITEM = NFWD+3	NTCOFTT 5204
DO 220 I = ITEM,N,2	NTCOFTT 5205
LCOOL = 5*I	NTCOFTT 5206
X(I) = X(I-2) + DLX(LCOOL)	NTCOFTT 5207
220 CONTINUE	NTCOFTT 5208
DO 230 I = ISTRT,IFNL,2	NTCOFTT 5209
P(1,ISLICE,I) = P(1,ISLICE,NFWD) - (P(1,ISLICE,NFWD) - PEXIT(ISLICE)) *	NTCOFTT 5210
Z (X(I)/X(N))**3	NTCOFTT 5211
230 P(1,ISLICE,I+1) = P(1,ISLICE,I)	NTCOFTT 5212
DO 232 I = 1,NSTA	NTCOFTT 5213
232 POLD(ISLICE,I) = P(1,ISLICE,I)	NTCOFTT 5214
DO 233 I = 1,NSTA	NTCOFTT 5215
233 P(2,ISLICE,I) = P(1,ISLICE,I)	NTCOFTT 5216
GO TO 240	NTCOFTT 5217
C	NTCOFTT 5218
234 DLTAPC = .84*(PIM-PIMOLD(ISLICE))	NTCOFTT 5219
PIMOLD(ISLICE) = PIM	NTCOFTT 5220

	DLTAPE = PEXIT(ISLICE) - PEXOLD(ISLICE)	NTCOFTT 5221
	PEXOLD(ISLICE) = PEXIT(ISLICE)	NTCOFTT 5222
	DO 235 I = 1, NFW	NTCOFTT 5223
235	P(2, ISLICE, I) = P(2, ISLICE, I) + DLTAPE	NTCOFTT 5224
	ISTR = NFW + 1	NTCOFTT 5225
	IFNL = NSTA - 1	NTCOFTT 5226
	DO 236 I = ISTR, IFNL, 2	NTCOFTT 5227
	P(2, ISLICE, I) = P(2, ISLICE, I) + DLTAPE * (1.0 - X(I) / X(IFNL)) +	NTCOFTT 5228
	Z DLTAPE * X(I) / X(IFNL)	NTCOFTT 5229
236	P(2, ISLICE, I + 1) = P(2, ISLICE, I)	NTCOFTT 5230
	DO 237 I = 1, NSTA	NTCOFTT 5231
237	POLD(ISLICE, I) = P(2, ISLICE, I)	NTCOFTT 5232
	GO TO 255	NTCOFTT 5233
C		NTCOFTT 5234
240	WRITE(6, 245)	NTCOFTT 5235
245	FORMAT(/' INITIAL PRESSURE DIST. (STATION NO., P) ' /)	NTCOFTT 5236
	WRITE(6, 250) (I, P(1, ISLICE, I), I = 1, ISTR)	NTCOFTT 5237
	WRITE(6, 250) (I, P(1, ISLICE, I), I = ITEM, N, 2)	NTCOFTT 5238
250	FORMAT(7(' (', I3, ',', ', F7.2, ')', '))	NTCOFTT 5239
C		NTCOFTT 5240
C		NTCOFTT 5241
C		NTCOFTT 5242
255	CONTINUE	NTCOFTT 5243
	DO 260 I = 1, 4	NTCOFTT 5244
260	PSAV(I) = 0.0	NTCOFTT 5245
C		NTCOFTT 5246
C	----INITIALLY, THE FLOW SPLIT AT THE LEADING EDGE IS ASSUMED	NTCOFTT 5247
C	TO BE 50/50 (DELTA = .5)	NTCOFTT 5248
C		NTCOFTT 5249
C	----IDELT COUNTS THE NUMBER OF FLOW SPLIT ITERATIONS. IF NO	NTCOFTT 5250
C	CONVERGENCE, IDELT IS SET NEGATIVE.	NTCOFTT 5251
C	----DELTA IS THE FRACTION OF FLOW TO THE SUCTION SIDE (EVEN	NTCOFTT 5252
C	NUMBERED STATIONS)	NTCOFTT 5253
C	----IVERGE COUNTS THE NUMBER OF ITERATIONS AT A GIVEN FLOW SPLIT	NTCOFTT 5254
C		NTCOFTT 5255
C	IFNL = THE NUMBER OF FLOW CHANNEL NODES, USED IN PRESSURE CALCULATIONS	NTCOFTT 5256
C		NTCOFTT 5257
	IF (NIT.EQ.1.AND.TYME.LT.0.0) DELTA(NISLICE) = .5	NTCOFTT 5258
275	CONTINUE	NTCOFTT 5259
	IFNL = NSTA - 3	NTCOFTT 5260
	IVERGE = 0	NTCOFTT 5261
	IDELT = 1	NTCOFTT 5262
	JS = 1	NTCOFTT 5263
	IF (NIT.GT.1) JS = JSO(NISLICE)	NTCOFTT 5264
290	CONTINUE	NTCOFTT 5265
	IVERGE = IVERGE + 1	NTCOFTT 5266
300	CONTINUE	NTCOFTT 5267
C		NTCOFTT 5268
	JSENS = JS - 2 * (JS / 2)	NTCOFTT 5269
C		NTCOFTT 5270
C	----SUBROUTINE FLOWS COMPUTES JET FLOW RATES, CROSSFLOW RATES, AND	NTCOFTT 5271
C	THE SQUARE OF THE MACH NUMBER	NTCOFTT 5272
C		NTCOFTT 5273
310	CONTINUE	NTCOFTT 5274
C		NTCOFTT 5275
	CALL FLOWS(JS, DELTA, ICHOKE, AMCHOK)	NTCOFTT 5276
320	CONTINUE	NTCOFTT 5277
	IF (WJ(NISLICE, JS).LE.0.0) GO TO 370	NTCOFTT 5278
C		NTCOFTT 5279
C	SUBROUTINE HCOOL COMPUTES IMPINGEMENT REGION HEAT TRANSFER COEFFICIENTS	NTCOFTT 5280

C	CALL HCOOL(JS)	NTCOFTT 5281
330	CONTINUE	NTCOFTT 5282
	CALL THRCON	NTCOFTT 5283
C	SUBROUTINE THRCON EXTRACTS THERMAL CONDUCTIVITIES FROM INPUT	NTCOFTT 5284
C	TABLES AKCTBL AND AKWTBL.	NTCOFTT 5285
C		NTCOFTT 5286
335	CONTINUE	NTCOFTT 5287
C		NTCOFTT 5288
C	---> CHECK TO MAKE SURE STAGNATION HC IS LESS THAN MAXIMUM PHYSICALLY	NTCOFTT 5289
C	POSSIBLE VALUE.	NTCOFTT 5290
C		NTCOFTT 5291
	IF (JS.EQ.1) ASTG = (DLX(9)+DLX(14))*SPAN/2.0	NTCOFTT 5292
	IF (JS.GT.1) ASTG = (DLX(5*JS-1)+DLX(5*JS+9))*SPAN/2.0	NTCOFTT 5293
	HSTGMX = WJ(ISLICE,JS)*CPO*144.*3600./ASTG	NTCOFTT 5294
	IF (HC(JS).GT.HSTGMX) HC(JS) = HSTGMX	NTCOFTT 5295
C		NTCOFTT 5296
C		NTCOFTT 5297
337	CONTINUE	NTCOFTT 5298
	CALL TAPPAY(JS,JSSENS,DELTAN)	NTCOFTT 5299
C		NTCOFTT 5300
C	SOLVE THE TCOF ARRAY AND SET NEW TEMPERATURE VALUES:	NTCOFTT 5301
C		NTCOFTT 5302
340	CONTINUE	NTCOFTT 5303
	CALL GAUSS(NODST,23)	NTCOFTT 5304
	DO 350 I = 1,NODST	NTCOFTT 5305
	T(2,ISLICE,I) = TCOF(I,24)	NTCOFTT 5306
	IF (T(2,ISLICE,I).LE.0.0) T(2,ISLICE,I) = T0G	NTCOFTT 5307
350	CONTINUE	NTCOFTT 5308
C	*****	NTCOFTT 5309
360	IF (ABS((T(2,ISLICE,NSAVE)-TSAVE)/TSAVE).GT..05)	NTCOFTT 5310
	Z CALL FLOWS(JS,DELTAN,ICHOKE,AMCHOK)	NTCOFTT 5311
	TSAVE = T(2,ISLICE,NSAVE)	NTCOFTT 5312
C	*****	NTCOFTT 5313
	IF (ICHOKE.EQ.0) GO TO 370	NTCOFTT 5314
	WRITE(8,365) ISLICE,IVERGE,IDELT,NIT,ICHOKE,AMCHOK	NTCOFTT 5315
365	FORMAT(/10X,'SLICE ',I2,' IS CHOKED FOR IVERGE =',I3,', IDELT =',	NTCOFTT 5316
	Z I3,', NIT =',I3,', ICHOKE =',I4,', M**2 =',F6.3)	NTCOFTT 5317
370	CONTINUE	NTCOFTT 5318
C		NTCOFTT 5319
C	COMPUTE NEW PRESSURES	NTCOFTT 5320
C		NTCOFTT 5321
	CALL PARRAY(JS,JSSENS,ICHOKE)	NTCOFTT 5322
C		NTCOFTT 5323
C	SOLVE THE TCOF ARRAY AND COMPUTE NEW PRESSURES	NTCOFTT 5324
C		NTCOFTT 5325
430	CONTINUE	NTCOFTT 5326
	CALL GAUSS(IFNL,19)	NTCOFTT 5327
440	CONTINUE	NTCOFTT 5328
	DO 460 I = 1,IFNL	NTCOFTT 5329
450	P(2,ISLICE,I) = TCOF(I,20)	NTCOFTT 5330
460	CONTINUE	NTCOFTT 5331
	P(2,ISLICE,IFNL+1) = P(2,ISLICE,IFNL)	NTCOFTT 5332
	P(2,ISLICE,NSTA-1) = PEXIT(ISLICE)	NTCOFTT 5333
	P(2,ISLICE,NSTA) = PEXIT(ISLICE)	NTCOFTT 5334
470	CONTINUE	NTCOFTT 5335
	IF (IWRITE.EQ.2) CALL WROUT(IDELT,JS,DELTAN,IVERGE)	NTCOFTT 5336
	IF (IPLOT.EQ.2) CALL PLOTMF(ALPH2)	NTCOFTT 5337
C		NTCOFTT 5338
480	CONTINUE	NTCOFTT 5339
		NTCOFTT 5340

C		NTCOFTT	5341
C	CHECK OVERALL CONVERGENCE	NTCOFTT	5342
C	CALCULATIONS ARE REPEATED UNTIL THE PRESSURE AT STATION 1 (NODE 5)	NTCOFTT	5343
C	HAS STABILIZED FOR	NTCOFTT	5344
C	FOUR ITERATIONS. THEN WE GO TO CHECK THE FLOW SPLIT.	NTCOFTT	5345
C		NTCOFTT	5346
	DO 490 I=1,3	NTCOFTT	5347
	K=5-I	NTCOFTT	5348
490	PSAV(K)=PSAV(K-1)	NTCOFTT	5349
	PSAV(1)=P(2,ISLICE,JS)	NTCOFTT	5350
C		NTCOFTT	5351
	DIFO=0.0	NTCOFTT	5352
	DO 500 I=1,3	NTCOFTT	5353
	JJ=I+1	NTCOFTT	5354
	DO 500 K=JJ,4	NTCOFTT	5355
	DIFN=ABS(PSAV(I)-PSAV(K))	NTCOFTT	5356
	IF(DIFO.LT.DIFN) DIFO=DIFN	NTCOFTT	5357
500	CONTINUE	NTCOFTT	5358
C		NTCOFTT	5359
510	DIFO=DIFO/(PIM-PEXIT(ISLICE))	NTCOFTT	5360
	PCNVRG = .01	NTCOFTT	5361
	IF (NIT.EQ.1.AND.NSLICE.GT.1) PCNVRG = .05	NTCOFTT	5362
	EPSN = (P(2,ISLICE,NFWD-1)-P(2,ISLICE,NFWD))/(P(2,ISLICE,NFWD-1))	NTCOFTT	5363
	IF (IDELT.EQ.1.AND.IVERGE.LT.3.AND.TYME.LE.0.0) GO TO 516	NTCOFTT	5364
	IF (DIFO.LE.PCNVRG.AND.IVEFGE.GE.4) GO TO 560	NTCOFTT	5365
516	CONTINUE	NTCOFTT	5366
	IF (IVERGE.LT.10) GO TO 520	NTCOFTT	5367
	IF (ABS(PSAV(1)-PSAV(2)).GT.ABS(PSAV(3)-PSAV(4))) V=1.-(1.-V)/2.	NTCOFTT	5368
520	CONTINUE	NTCOFTT	5369
	DO 530 I = 1,NSTA	NTCOFTT	5370
	P(2,ISLICE,I) = P(2,ISLICE,I) + V*(POLD(ISLICE,I) - P(2,ISLICE,I))	NTCOFTT	5371
	IF (P(2,ISLICE,I).GE.PIM) P(2,ISLICE,I) = .999*PIM	NTCOFTT	5372
	POLD(ISLICE,I) = P(2,ISLICE,I)	NTCOFTT	5373
	TTOTC(I) = T(2,ISLICE,5*I)*(1.+(GAMC(I)-1.)*AM2(I)/2.)	NTCOFTT	5374
530	CONTINUE	NTCOFTT	5375
C		NTCOFTT	5376
540	CONTINUE	NTCOFTT	5377
	IF (IVERGE.GT.30.OR.V.GT..95)	NTCOFTT	5378
Z	WRITE(8,550) IVERGE,V,(PSAV(I),I=1,4)	NTCOFTT	5379
550	FORMAT(' ***** CONVERGENCE PROBLEMS *****'/	NTCOFTT	5380
Z	' IVERGE=',I3,'; V= ',F6.4,'; PSAV= ',4(F10.2))	NTCOFTT	5381
	IF (IVERGE.GT.50) GO TO 590	NTCOFTT	5382
	GO TO 290	NTCOFTT	5383
C		NTCOFTT	5384
C*****	ONCE PRESSURE-TEMPERATURE ITERATION HAS CONVERGED, CHECK	NTCOFTT	5385
C	THE FLOW SPLIT AND ADJUST IF NECESSARY.	NTCOFTT	5386
C		NTCOFTT	5387
560	CONTINUE	NTCOFTT	5388
	IF (IWRITE.EQ.1) CALL WROUT(IDELT,JS,DELTAN,IVERGE)	NTCOFTT	5389
	IF (ICHOKE.GT.0) WRITE(6,565) ICHOKE,AMCHOK	NTCOFTT	5390
565	FORMAT(/10X,'MACH NO. > 1 AT STATION ',I4,', M**2 =',F6.3/)	NTCOFTT	5391
570	CONTINUE	NTCOFTT	5392
	EPSN = (P(2,ISLICE,NFWD-1)-P(2,ISLICE,NFWD))/(P(2,ISLICE,NFWD-1))	NTCOFTT	5393
575	CONTINUE	NTCOFTT	5394
	IF (TYME.GT.0.0) GO TO 590	NTCOFTT	5395
	CALL FLSPLT(AJET,EPSN,ISLICE,NODSF,IDELT,JS,DELTAN,ICONV)	NTCOFTT	5396
580	CONTINUE	NTCOFTT	5397
	IF (ICONV.EQ.1) CALL WROUT(IDELT,JS,DELTAN,IVERGE)	NTCOFTT	5398
	IVERGE = 0	NTCOFTT	5399
	IF (ICONV.EQ.0) GO TO 290	NTCOFTT	5400

590	CONTINUE	NTCOFTT 5401
	IF (TYME.GT.0.0) CALL WROUT(IDELT,JS,DELTAN,IVERGE)	NTCOFTT 5402
	JSO(ISLICE) = JS	NTCOFTT 5403
	RETURN	NTCOFTT 5404
	END	NTCOFTT 5405
C----	SOURCE.NTHRCNT	NTHRCNT 5406
	SUBROUTINE THRCON	NTHRCNT 5407
C		NTHRCNT 5408
C-	SOURCE.NTHRCNT----	NTHRCNT 5409
C		NTHRCNT 5410
	COMMON /BOUND/ BCXS(400), BCXP(400), BCHGS(1000), BCHGP(1000),	NTHRCNT 5411
Z	BCTGS(1000), BCTGP(1000), BCQGS(1000), BCQGP(1000),	NTHRCNT 5412
Z	BCPGS(1000), BCPGP(1000), THUBIN(400), THUB(80),	NTHRCNT 5413
Z	QHUBIN(400), QHUB(80), TTIPIN(400), TTIP(80),	NTHRCNT 5414
Z	QTIPIN(400), QTIP(80), RHOVG(400), PEX(400),	NTHRCNT 5415
Z	BCTIME(50), TTIO(50), PTIO(50), WPLEN,	NTHRCNT 5416
Z	WSVST(50), AKCTBL(20), AKWTBL(20), NBCS, NBCP	NTHRCNT 5417
C		NTHRCNT 5418
	COMMON /TCO/ ADUMP, BTA, CD, CP,	NTHRCNT 5419
Z	GAM, FIM, R, SPAN, TOG,	NTHRCNT 5420
Z	WDUMP, WIM, AKC(15,80), AKW(15,80),	NTHRCNT 5421
Z	A(400), AJET(80), AM2(80), CNUM(80),	NTHRCNT 5422
Z	DH(80), DHF(80), DHJ(80),	NTHRCNT 5423
Z	DLX(400), FF(80), HC(80), HG(80),	NTHRCNT 5424
Z	P(2,15,80), PEXIT(15), PUMP(80), QG(80),	NTHRCNT 5425
Z	QSNK(80), PR(80), S(15), T(2,15,400),	NTHRCNT 5426
Z	TG(80), TAU(400), WFC(80),	NTHRCNT 5427
Z	WJ(15,80), WCROS(2,15,80), XN(80),	NTHRCNT 5428
Z	ICOR, IFILM, IHUB, ITIP,	NTHRCNT 5429
Z	ISBLOK, ISLICE, NBLKSZ, NSLICE,	NTHRCNT 5430
Z	NFWD, NSTA, IHC(80)	NTHRCNT 5431
C		NTHRCNT 5432
	DO 1000 I = 1,NSTA	NTHRCNT 5433
	L = 5*I - 2	NTHRCNT 5434
	LJ = L - 1	NTHRCNT 5435
	LOUT = L - 2	NTHRCNT 5436
	TC = (T(2,ISLICE,LJ) + T(2,ISLICE,LOUT))/2.0 - 460.	NTHRCNT 5437
	TW = T(2,ISLICE,L) - 460.	NTHRCNT 5438
C		NTHRCNT 5439
C	LOOK UP COATING THERMAL CONDUCTIVITY IN TABLE AKCTBL.	NTHRCNT 5440
C		NTHRCNT 5441
	IF (TC.GT.AKCTBL(1)) GO TO 150	NTHRCNT 5442
C		NTHRCNT 5443
C	FOR A TEMPERATURE LOWER THAN THE BOTTOM OF THE TABLE, EXTRAPOLATE	NTHRCNT 5444
C	BELOW TABLE	NTHRCNT 5445
	RATIO = (TC - AKCTBL(1))/(AKCTBL(3) - AKCTBL(1))	NTHRCNT 5446
	AKC(ISLICE,1) = AKCTBL(2) + (AKCTBL(4) - AKCTBL(2))*RATIO	NTHRCNT 5447
	GO TO 500	NTHRCNT 5448
C		NTHRCNT 5449
150	CONTINUE	NTHRCNT 5450
C		NTHRCNT 5451
C	FIND SIZE OF TABLE	NTHRCNT 5452
C		NTHRCNT 5453
	DO 152 J = 3,19,2	NTHRCNT 5454
	JLST = J-1	NTHRCNT 5455
	IF (AKCTBL(J).LE.0.1) GO TO 154	NTHRCNT 5456
152	CONTINUE	NTHRCNT 5457
154	JLSTM = JLST-1	NTHRCNT 5458
C		NTHRCNT 5459
C	LOCATE WHERE TEMPERATURE FALLS IN THE TABLE AKCTBL.	NTHRCNT 5460

C	DO 170 J = 3,JLSTM,2	NTHRCNT 5461
	IF (TC.GT.AKCTBL(J)) GO TO 160	NTHRCNT 5462
C		NTHRCNT 5463
C	FOUND LOCATION, NOW INTERPOLATE.	NTHRCNT 5464
C		NTHRCNT 5465
	RATIO = (TC - AKCTBL(J-2))/(AKCTBL(J) - AKCTBL(J-2))	NTHRCNT 5466
	AKC(ISLICE,I) = AKCTBL(J-1) + (AKCTBL(J+1) - AKCTBL(J-1))*RATIO	NTHRCNT 5467
	GO TO 500	NTHRCNT 5468
160	IF (J.LT.JLSTM) GO TO 170	NTHRCNT 5469
C		NTHRCNT 5470
C	TEMPERATURE IS ABOVE THE RANGE OF THE TABLE, SO EXTRAPOLATE UP.	NTHRCNT 5471
C		NTHRCNT 5472
	RATIO = (TC - AKCTBL(J-2))/(AKCTBL(J) - AKCTBL(J-2))	NTHRCNT 5473
	AKC(ISLICE,I) = AKCTBL(J-1) + (AKCTBL(J+1) - AKCTBL(J-1))*RATIO	NTHRCNT 5474
	GO TO 500	NTHRCNT 5475
170	CONTINUE	NTHRCNT 5476
500	CONTINUE	NTHRCNT 5477
C		NTHRCNT 5478
C	NOW LOOK UP METAL CONDUCTIVITY IN TABLE AKWTBL.	NTHRCNT 5479
C		NTHRCNT 5480
	IF (TW.GT.AKWTBL(1)) GO TO 550	NTHRCNT 5481
C		NTHRCNT 5482
C	FOR A TEMPERATURE LOWER THAN THE BOTTOM OF THE TABLE, EXTRAPOLATE	NTHRCNT 5483
C	BELOW TABLE	NTHRCNT 5484
	RATIO = (TW - AKWTBL(1))/(AKWTBL(3) - AKWTBL(1))	NTHRCNT 5485
	AKW(ISLICE,I) = AKWTBL(2) + (AKWTBL(4) - AKWTBL(2))*RATIO	NTHRCNT 5486
	GO TO 1000	NTHRCNT 5487
C		NTHRCNT 5488
550	CONTINUE	NTHRCNT 5489
C		NTHRCNT 5490
C	FIND SIZE OF TABLE	NTHRCNT 5491
C		NTHRCNT 5492
	DO 552 J = 3,19,2	NTHRCNT 5493
	JLST = J-1	NTHRCNT 5494
	IF (AKWTBL(J).LE.0.1) GO TO 554	NTHRCNT 5495
552	CONTINUE	NTHRCNT 5496
554	JLSTM = JLST-1	NTHRCNT 5497
C		NTHRCNT 5498
C	LOCATE WHERE TEMPERATURE FALLS IN THE TABLE AKWTBL.	NTHRCNT 5499
C		NTHRCNT 5500
	DO 570 J = 3,JLSTM,2	NTHRCNT 5501
	IF (TW.GT.AKWTBL(J)) GO TO 560	NTHRCNT 5502
C		NTHRCNT 5503
C	FOUND LOCATION, NOW INTERPOLATE.	NTHRCNT 5504
C		NTHRCNT 5505
	RATIO = (TW - AKWTBL(J-2))/(AKWTBL(J) - AKWTBL(J-2))	NTHRCNT 5506
	AKW(ISLICE,I) = AKWTBL(J-1) + (AKWTBL(J+1) - AKWTBL(J-1))*RATIO	NTHRCNT 5507
	GO TO 1000	NTHRCNT 5508
560	IF (J.LT.JLSTM) GO TO 570	NTHRCNT 5509
C		NTHRCNT 5510
C	TEMPERATURE IS ABOVE THE RANGE OF THE TABLE, SO EXTRAPOLATE UP.	NTHRCNT 5511
C		NTHRCNT 5512
	RATIO = (TW - AKWTBL(J-2))/(AKWTBL(J) - AKWTBL(J-2))	NTHRCNT 5513
	AKW(ISLICE,I) = AKWTBL(J-1) + (AKWTBL(J+1) - AKWTBL(J-1))*RATIO	NTHRCNT 5514
	GO TO 1000	NTHRCNT 5515
570	CONTINUE	NTHRCNT 5516
1000	CONTINUE	NTHRCNT 5517
	RETURN	NTHRCNT 5518
	END	NTHRCNT 5519
		NTHRCNT 5520

C----	SOURCE.NWROTTT	NWROTTT	5521
	SUBROUTINE WROUT (IDELT,JS,DELTAN,IVERGE)	NWROTTT	5522
C		NWROTTT	5523
C-	SOURCE.NWROTTT----	NWROTTT	5524
C		NWROTTT	5525
C	DUMR2 CARRIES THE IMPINGEMENT JET REYNOLDS NO. IN FROM HCCOOL.	NWROTTT	5526
C		NWROTTT	5527
	COMMON /CHKHOL/ WCHK(80), WCHKDM	NWROTTT	5528
C		NWROTTT	5529
	COMMON /FLMCOL/ RHOVGA(80), FG(80), XFC(80), FLMEFF(80),	NWROTTT	5530
Z	XMUC(80), FMES(80), REFC(80), NFCSUP(80)	NWROTTT	5531
C		NWROTTT	5532
	COMMON /PRPS/ CPO, GAMO, DP(80), SP(80), RE(80),	NWROTTT	5533
Z	CPC(80), GAMC(80), DUMR1(80), DUMR2(80)	NWROTTT	5534
C		NWROTTT	5535
	COMMON /RADL/ APLN(15), DPLN(15), RIN(15), ROUT(15),	NWROTTT	5536
Z	PIN(15), TIN(15), W(15), WS	NWROTTT	5537
C		NWROTTT	5538
	COMMON /TCO/ ADUMP, BTA, CD, CP,	NWROTTT	5539
Z	GAM, FIM, R, SPAN, TOG,	NWROTTT	5540
Z	WDUMP, WIM, AKC(15,80), AKW(15,80),	NWROTTT	5541
Z	A(400), AJET(80), AM2(80), CNUM(80),	NWROTTT	5542
Z	DH(80), DHF(80), DHJ(80),	NWROTTT	5543
Z	DLX(400), FF(80), HC(80), HG(80),	NWROTTT	5544
Z	P(2,15,80), PEXIT(15), PUMP(80), QG(80),	NWROTTT	5545
Z	QSNK(80), RR(80), S(15), T(2,15,400),	NWROTTT	5546
Z	TG(80), TAU(400), WFC(80),	NWROTTT	5547
Z	WJ(15,80), WCROS(2,15,80), XN(80),	NWROTTT	5548
Z	ICOR, IFILM, IHUB, ITIP,	NWROTTT	5549
Z	ISBLOK, ISLICE, NBLKSZ, NSLICE,	NWROTTT	5550
Z	NFWD, NSTA, IHC(80)	NWROTTT	5551
C		NWROTTT	5552
	COMMON /TRNSNT/ RHOC, RHOM, SPHTC, SPHTM,	NWROTTT	5553
Z	DLTYME, TYME, TEPS, TYMMAX	NWROTTT	5554
C		NWROTTT	5555
	COMMON /UNITS/ CINCH(2), CHTC(2), CHFLX(2), CPRSR(2), CMSFL(2),	NWROTTT	5556
Z	CTMPF(2), CTCGN(2), CDEN(2), CSPHT(2), CGASC(2),	NWROTTT	5557
Z	CVISC(2), CRHOVG(2), IUNITS	NWROTTT	5558
C		NWROTTT	5559
	DIMENSION DUM1(10),DUM2(10),DELTAN(15)	NWROTTT	5560
10	CONTINUE	NWROTTT	5561
	IF (ISLICE.EQ.1) TBULK = 0.0	NWROTTT	5562
	IF (ISLICE.EQ.1) TOTSPN = 0.0	NWROTTT	5563
	TTYME = TYME	NWROTTT	5564
	IF (TTYME.LT.0.) TTYME=0.0	NWROTTT	5565
	WRITE(6,90) TTYME,DLTYME,WS	NWROTTT	5566
90	FORMAT(1H1,10X,' TIME = ',F6.2,' SEC., STEP SIZE = ',F6.3,	NWROTTT	5567
Z	' SEC., WHEEL SPEED = ',F8.1,' RPM')	NWROTTT	5568
8805	WRITE(6,8806) ISLICE,IDELT,JS,DELTAN(ISLICE),IVERGE	NWROTTT	5569
	ITRBG = NFWD + 2	NWROTTT	5570
	WRITE(6,100) ITRBG	NWROTTT	5571
C		NWROTTT	5572
	IF (IUNITS.EQ.2) WRITE(6,270)	NWROTTT	5573
	IF (IUNITS.EQ.1) WRITE(6,271)	NWROTTT	5574
	DO 210 I = 1,NSTA,2	NWROTTT	5575
	II = I	NWROTTT	5576
	LCOOL = 5*II	NWROTTT	5577
	NOS = LCOOL - 4	NWROTTT	5578
	DO 205 J = 1,4	NWROTTT	5579
	JM = NOS+J-1	NWROTTT	5580

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DUM1(J) = T(2,ISLICE,JM) - 460.
IF (IUNITS.EQ.1) DUM1(J) = T(2,ISLICE,JM)/CTMPF(1)
205 CONTINUE
DUM1(5) = T(2,ISLICE,LCOOL) - 460.
IF (IUNITS.EQ.1) DUM1(5) = T(2,ISLICE,LCOOL)/CTMPF(1)
DUM1(6) = P(2,ISLICE,II)/CPRSF(IUNITS)
DUM1(7) = DUM1(6)*(1.+(GAMC(II)-1.)*AM2(II)/2.)*(GAMC(II)/(
Z (GAMC(II)-1.))
DUM1(8) = HC(II)/CHTC(IUNITS)
DUM1(9) = HG(II)/CHTC(IUNITS)
DUM1(10) = TG(II) - 460.
IF (IUNITS.EQ.1) DUM1(10) = TG(II)/1.8
IF (BTA.GT..001) DUM1(10) = 9.E20
IF (BTA.GT..001) DUM1(9) = 9.E20
WRITE(6,274) (II,LCOOL,(DUM1(J),J=1,10))
IF (I.EQ.NFWD) WRITE(6,276)
210 CONTINUE
IF (IUNITS.EQ.2) WRITE(6,278)
IF (IUNITS.EQ.1) WRITE(6,279)
DO 220 I = 1,NSTA,2
II = I
LCOOL = 5*II
NOS = LCOOL - 4
DUM2(1) = WJ(ISLICE,II)/CMSFL(IUNITS)
DUM2(2) = DUMR2(II)
DUM2(3) = WCROS(2,ISLICE,II)/CMSFL(IUNITS)
DUM2(4) = RE(II)
DUM2(5) = SQRT(AM2(II))
DUM2(6) = FF(II)
DUM2(7) = WFC(II)/CMSFL(IUNITS)
DUM2(8) = FLMEFF(II)
WRITE(6,280) (II,LCOOL,DUM2(1),WCHK(II),(DUM2(J),J=2,8))
IF (I.EQ.NFWD) WRITE(6,276)
220 CONTINUE
DUM2(9) = WDUMP/CMSFL(IUNITS)
IF (ADUMP.GT.0.0.AND.IUNITS.EQ.2) WRITE(6,290) DUM2(9),WCHKDM
IF (ADUMP.GT.0.0.AND.IUNITS.EQ.1) WRITE(6,291) DUM2(9),WCHKDM
C
ITRBG = NFWD + 1
WRITE(6,124) ISLICE,ITRBG
C
IF (IUNITS.EQ.2) WRITE(6,270)
IF (IUNITS.EQ.1) WRITE(6,271)
DO 230 I = 1,NSTA,2
II = I
IF (I.GT.1) II = I-1
LCOOL = 5*II
NOS = LCOOL - 4
DO 225 J = 1,5
JM = NOS+J-1
DUM1(J) = T(2,ISLICE,JM) - 460.
IF (IUNITS.EQ.1) DUM1(J) = T(2,ISLICE,JM)/CTMPF(1)
225 CONTINUE
DUM1(6) = P(2,ISLICE,II)/CPRSF(IUNITS)
DUM1(7) = DUM1(6)*(1.+(GAMC(II)-1.)*AM2(II)/2.)*(GAMC(II)/(
Z (GAMC(II)-1.))
DUM1(8) = HC(II)/CHTC(IUNITS)
DUM1(9) = HG(II)/CHTC(IUNITS)
DUM1(10) = TG(II) - 460.
IF (IUNITS.EQ.1) DUM1(10) = TG(II)/1.8

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NWROTTT 5581
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NWROTTT 5639
NWROTTT 5640

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IF (BTA.GT..001) DUM1(10) = 9.E20
IF (BTA.GT..001) DUM1(9) = 9.E20
WRITE(6,274) (II,LCOOL,(DUM1(J),J=1,10))
IF (I.EQ.NFWD) WRITE(6,276)
230 CONTINUE
IF (IUNITS.EQ.2) WRITE(6,278)
IF (IUNITS.EQ.1) WRITE(6,279)
DO 240 I = 1,NSTA,2
II = I
IF (I.GT.1) II = I-1
LCOOL = 5*II
NOS = LCOOL - 4
DUM2(1) = WJ(ISLICE,II)/CMSFL(IUNITS)
DUM2(2) = DUMR2(II)
DUM2(3) = WCROS(2,ISLICE,II)/CMSFL(IUNITS)
DUM2(4) = RE(II)
DUM2(5) = SQRT(AM2(II))
DUM2(6) = FF(II)
DUM2(7) = WFC(II)/CMSFL(IUNITS)
DUM2(8) = FLMEFF(II)
WRITE(6,280) (II,LCOOL,DUM2(1),WCHK(II),(DUM2(J),J=2,8))
IF (I.EQ.NFWD) WRITE(6,276)
240 CONTINUE
DUM2(9) = WDUMP/CMSFL(IUNITS)
IF (ADUMP.GT.0.0.AND.IUNITS.EQ.2) WRITE(6,290) DUM2(9),WCHKDM
IF (ADUMP.GT.0.0.AND.IUNITS.EQ.1) WRITE(6,291) DUM2(9),WCHKDM
C
1000 CONTINUE
C
C TO DETERMINE THE MEAN OUTSIDE SURFACE TEMPERATURE FOR EACH
C SIDE OF THE BLADE, AND
C TO LOCATE THE EXTREME TEMPERATURE POINTS, BOTH HIGH AND LOW.
C
XTOT = 0.
XTOTMD = 0.0
HBAR = HC(1)*(DLX(2)+DLX(3))/2.
TBAR = T(2,ISLICE,1)*(DLX(6)+DLX(11))/2.
TBARMD = T(2,ISLICE,3)*(DLX(8)+DLX(13))/2.
ISTAT = 1
DO 1004 I = 2,NSTA
NODM = 5*I-2
ISTAT = ISTAT + 5
ISTATD = ISTAT + 10
TBARMD = TBARMD + T(2,ISLICE,NODM)*(DLX(NODM)+DLX(NODM+10))/2.
XTOTMD = XTOTMD + DLX(NODM)
TBAR = TBAR + T(2,ISLICE,ISTAT)*(DLX(ISTAT)+DLX(ISTATD))/2.
XTOT = XTOT + DLX(ISTAT)
HBAR = HBAR + HC(I)*(DLX(ISTAT)+DLX(ISTATD))/2.
1004 CONTINUE
IF (IUNITS.EQ.1) TBAR = TBAR/(1.8*XTOT)
IF (IUNITS.EQ.2) TBAR = TBAR/XTOT - 460.
IF (IUNITS.EQ.1) TBARMD = TBARMD/(1.8*XTOTMD)
IF (IUNITS.EQ.2) TBARMD = TBARMD/XTOTMD - 460.
TBULK = TBULK + TBARMD*S(ISLICE)
TOTSPN = TOTSPN + S(ISLICE)
HBAR = HBAR/(XTOT*CHTC(IUNITS))
1008 IF (IUNITS.EQ.2) WRITE(6,1115) TBAR,TBARMD,HBAR
IF (IUNITS.EQ.1) WRITE(6,1116) TBAR,TBARMD,HBAR
C
TSMAX = T(2,ISLICE,1) - 460.

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NWROTTT 5697
NWROTTT 5698
NWROTTT 5699
NWROTTT 5700

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TSMIN = T(2,ISLICE,1) - 460.	NWROTTT 5701
TPMAX = T(2,ISLICE,1) - 460.	NWROTTT 5702
TPMIN = T(2,ISLICE,1) - 460.	NWROTTT 5703
ISUCMX = 1	NWROTTT 5704
ISUCMN = 1	NWROTTT 5705
IPRSMX = 1	NWROTTT 5706
IPRSMN = 1	NWROTTT 5707
IPRES = 1	NWROTTT 5708
ISUCT = -4	NWROTTT 5709
C	NWROTTT 5710
DO 1080 I = 3,NSTA,2	NWROTTT 5711
IPRES = IPRES + 10	NWROTTT 5712
ISUCT = ISUCT + 10	NWROTTT 5713
C	NWROTTT 5714
C	NWROTTT 5715
IF (T(2,ISLICE,IPRES)-460..GT.TPMAX) GO TO 1030	NWROTTT 5716
IF (T(2,ISLICE,IPRES)-460..LT.TPMIN) GO TO 1040	NWROTTT 5717
GO TO 1050	NWROTTT 5718
C	NWROTTT 5719
1030 TPMAX = T(2,ISLICE,IPRES) -460.	NWROTTT 5720
IPRSMX = I	NWROTTT 5721
GO TO 1050	NWROTTT 5722
C	NWROTTT 5723
1040 TPMIN = T(2,ISLICE,IPRES) -460.	NWROTTT 5724
IPRSMN = I	NWROTTT 5725
C	NWROTTT 5726
1050 IF (T(2,ISLICE,ISUCT)-460..GT.TSMAX) GO TO 1060	NWROTTT 5727
IF (T(2,ISLICE,ISUCT)-460..LT.TSMIN) GO TO 1070	NWROTTT 5728
GO TO 1080	NWROTTT 5729
C	NWROTTT 5730
1060 TSMAX = T(2,ISLICE,ISUCT) -460.	NWROTTT 5731
ISUCMX = I - 1	NWROTTT 5732
GO TO 1080	NWROTTT 5733
C	NWROTTT 5734
1070 TSMIN = T(2,ISLICE,ISUCT) -460.	NWROTTT 5735
ISUCMN = I - 1	NWROTTT 5736
1080 CONTINUE	NWROTTT 5737
C	NWROTTT 5738
C	NWROTTT 5739
IF (ISLICE.LT.NSLICE) GO TO 1095	NWROTTT 5740
TBULK = TBULK/TOTSPN	NWROTTT 5741
IF (IUNITS.EQ.1) WRITE(6,1091) TYME,TBULK	NWROTTT 5742
IF (IUNITS.EQ.2) WRITE(6,1090) TYME,TBULK	NWROTTT 5743
C	NWROTTT 5744
1090 FORMAT(1H2,30X,'TIME =',F6.3,' SEC., OVERALL BULK TEMPERATURE =',F7.1,' F')	NWROTTT 5745
Z	NWROTTT 5746
1091 FORMAT(1H2,30X,'TIME =',F6.3,' SEC., OVERALL BULK TEMPERATURE =',F7.1,' K')	NWROTTT 5747
Z	NWROTTT 5748
1095 CONTINUE	NWROTTT 5749
1115 FORMAT(/' OVERALL AREA WEIGHTED AVERAGES--OUTSIDE T =',F7.1,	NWROTTT 5750
Z ' F, MID-WALL T =',F7.1,	NWROTTT 5751
Z ' F, COOLANT H = 'F6.1,' BTU/(HR/FT**2/R)')	NWROTTT 5752
1116 FORMAT(/' OVERALL AREA WEIGHTED AVERAGES--OUTSIDE T =',F7.1,	NWROTTT 5753
Z ' K, MID-WALL T =',F7.1,	NWROTTT 5754
Z ' K, COOLANT H = 'F6.1,' WATTS/M**2/K')	NWROTTT 5755
IF (IUNITS.EQ.2) WRITE(6,1120) TPMAX,IPRSMX,TPMIN,IPRSMN,TSMAX,	NWROTTT 5756
Z ISUCMX,TSMIN,ISUCMN	NWROTTT 5757
1120 FORMAT(/12X,'EXTREMES OF OUTER SURFACE TEMPERATURES (F)'/6X,	NWROTTT 5758
Z 'PRESSURE SIDE: ',	NWROTTT 5759
Z F7.1,' AT STATION ',I2,', ',F7.1,' AT STATION ',I2/6X,	NWROTTT 5760

Z	'SUCTION SIDE: ',	NWROTTT	5761
Z	F7.1,' AT STATION ',I2,', ',F7.1,' AT STATION ',I2)	NWROTTT	5762
	IF (IUNITS.EQ.2) GO TO 1130	NWROTTT	5763
	TPMAX = (TPMAX+460.)/1.8	NWROTTT	5764
	TPMIN = (TPMIN+460.)/1.8	NWROTTT	5765
	TSMAX = (TSMAX+460.)/1.8	NWROTTT	5766
	TSMIN = (TSMIN+460.)/1.8	NWROTTT	5767
	WRITE(6,1125) TPMAX,IPRSMX,TPMIN,IPRSMN,TSMAX,ISUCMX,TSMIN,ISUCMN	NWROTTT	5768
1125	FORMAT(/12X,'EXTREMES OF OUTER SURFACE TEMPERATURES (K) '/6X,	NWROTTT	5769
Z	'PRESSURE SIDE: ',	NWROTTT	5770
Z	F7.1,' AT STATION ',I2,', ',F7.1,' AT STATION ',I2/6X,	NWROTTT	5771
Z	'SUCTION SIDE: ',	NWROTTT	5772
Z	F7.1,' AT STATION ',I2,', ',F7.1,' AT STATION ',I2)	NWROTTT	5773
1130	CONTINUE	NWROTTT	5774
100	FORMAT(30X,'PRESSURE SIDE , TRAILING EDGE REGION BEGINS AT ',	NWROTTT	5775
Z	'STATION-',I3)	NWROTTT	5776
124	FORMAT(1H1,/' SLICE NO. ',I2,17X,'SUCTION SIDE , TRAILING EDGE ',	NWROTTT	5777
Z	'REGION BEGINS AT STATION-',I3)	NWROTTT	5778
8806	FORMAT(' SLICE NO.',I2,', FLOW SPLIT NO.',I3,', SPLIT AT ',	NWROTTT	5779
Z	'STATION',I3,	NWROTTT	5780
Z	'; FRACTION SPLIT TO SUCTION SIDE IS',F7.4,I6,' ITERATIONS')	NWROTTT	5781
270	FORMAT(/	NWROTTT	5782
Z	' STATION*COOLANT* OUTSIDE *INTERFACE* MID-WALL* INSIDE * ',	NWROTTT	5783
Z	' COOLANT * STATIC P* TOTAL P * HC,BTU/HR* HG,BTU/HR* TG'	NWROTTT	5784
Z	'/' NUMBER *NODE NO* T (F) * T (F) * T (F) * T (F) * T ',	NWROTTT	5785
Z	' (F) * (PSIA) * (PSIA) * /FT**2/R * /FT**2/R * (F) '	NWROTTT	5786
Z	/119(''')/)	NWROTTT	5787
271	FORMAT(/	NWROTTT	5788
Z	' STATION*COOLANT* OUTSIDE *INTERFACE* MID-WALL* INSIDE * ',	NWROTTT	5789
Z	' COOLANT * STATIC P* TOTAL P * HC * HG * TG'	NWROTTT	5790
Z	'/' NUMBER *NODE NO* T (K) * T (K) * T (K) * T (K) * T ',	NWROTTT	5791
Z	' (K) * (KPA) * (KPA) * W/M**2/K * W/M**2/K * (K) '	NWROTTT	5792
Z	/119(''')/)	NWROTTT	5793
274	FORMAT(I6,2X,I6,1X,7F10.1,3F11.1)	NWROTTT	5794
276	FORMAT(47X,'BEGIN TRAILING EDGE REGION')	NWROTTT	5795
278	FORMAT(1H2,/' STATION * COOLANT * IMP. FLOW * RE-NO. * CROSSFLOW',	NWROTTT	5796
Z	' * RE-NO. * MACH NO., '	NWROTTT	5797
Z	' FRICTION * FILM FLOW * EFFECTIVENESS *'/	NWROTTT	5798
Z	' NUMBER * NODE NO * (LBM/SEC) * JET * (LBM/SEC) ',	NWROTTT	5799
Z	' * CROSSFLOW * CROSSFLOW *'	NWROTTT	5800
Z	' FACTOR * (LBM/SEC) *'/115(''')/19X,'',20X,'',46X,'')	NWROTTT	5801
279	FORMAT(1H2,/' STATION * COOLANT * IMP. FLOW * RE-NO. * CROSSFLOW',	NWROTTT	5802
Z	' * RE-NO. * MACH NO., '	NWROTTT	5803
Z	' FRICTION * FILM FLOW * EFFECTIVENESS *'/	NWROTTT	5804
Z	' NUMBER * NODE NO * (KG/SEC) * JET * (KG/SEC) ',	NWROTTT	5805
Z	' * CROSSFLOW * CROSSFLOW *'	NWROTTT	5806
Z	' FACTOR * (KG/SEC) *'/115(''')/19X,'',20X,'',46X,'')	NWROTTT	5807
280	FORMAT(1H,I5,5X,I5,' *',F9.6,A1,F9.1,' *',F9.6,2X,F9.1,4X,F9.6	NWROTTT	5808
Z	,2X,F9.6,' *',F9.6,4X,F9.6)	NWROTTT	5809
290	FORMAT(/15X,' FLOW DUMPED DIRECTLY INTO TRAILING EDGE REGION IS 'NWROTTT	NWROTTT	5810
Z	,F10.6,A1,' LBM/SEC')	NWROTTT	5811
291	FORMAT(/15X,' FLOW DUMPED DIRECTLY INTO TRAILING EDGE REGION IS 'NWROTTT	NWROTTT	5812
Z	,F10.6,A1,' KG/SEC')	NWROTTT	5813
	RETURN	NWROTTT	5814
	END	NWROTTT	5815

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2. Poferl, David J.; and Svehla, Roger A.: Thermodynamic and Transport Properties of Air and Its Products of Combustion with ASTM-A-1 Fuel and Natural Gas at 20, 30, and 40 Atmospheres. NASA TN D-7488, 1973.
3. Stollery, J. L.; and El-Ehwany, A. A. M.: A Note on the Use of a Boundary-Layer Model for Correlating Film-Cooling Data. Int. J. Heat Mass Transfer, vol. 8, 1965, pp. 55-65.

TABLE I. - SUBROUTINE CALLS AND COMMON BLOCKS

Subroutine name	Source module	COMMON blocks	Called subroutines	Calling subroutines	Subroutine name	Source module	COMMON blocks	Called subroutines	Calling subroutines
BLOCK DATA	NGASDAT	/GAAS/	NONE	NONE	PARRAY	NPARAYT	/MATRX/ /PRPS/ /TCO/ /TRNSNT/	NONE	TCOEF
FLWS	NFLOEST	/CHKHOL/ /FLMCOL/ /FRIC/ /PRPS/ /TCO/ /TRNSNT/	GASTBL	TCOEF	PLNUM	NPLENMP	/RADL/ /TCO/ /TRNSNT/ /UNITS/	GASTBL	MAIN PROGRAM
FLSPLT	NFLSPLP	NONE	NONE	TCOEF	PLOTMF	NPLOTIT	/PRPS/ /SPECL/ /TCO/ /TRNSNT/ /UNITS/	NONE	TCOEF MAIN PROGRAM
GASTBL	NGASTB	/GAAS/	NONE	FLWS HCFRCD HCOOL HCPINS PLNUM TARRAY	PREP	NPREPAT	/BOUND/ /FLMCOL/ /FRIC/ /PRPS/ /SPECL/ /TCO/ /TRNSNT	NONE	INPRT MAIN PROGRAM
GAUSS	NGAUS	/MATRX/	NONE	TCOEF	TARRAY	NTARAYT	/BOUND/ /FLMCOL/ /MATRX/ /PRPS/ /TCO/ /TRNSNT/	GASTBL HCFRCD HCPINS	TCOEF
GETIN	NGETINT	/BOUND/ /FLMCOL/ /IMPCOR/ /RADL/ /SPECL/ /TCO/ /TRNSNT/ /UNITS	INPRT	MAIN PROGRAM	TCOEF	NTCOFTT	/MATRX/ /PRPS/ /TCO/ /TRNSNT/	FLWS FLSPLT GAUSS HCOOL PARRAY PLOTMF TARRAY THRCON WROUT	MAIN PROGRAM
HCFRCD	NHCFRCT	/TCO/	GASTBL	HCOOL TARRAY	THRCON	NTHRCNT	/BOUND/ /TCO/	NONE	TCOEF
HCOOL	NHCOOLT	/IMPCOR/ /PRPS/ /TCO/	GASTBL HCFRCD	TCOEF	WROUT	NWROTTT	/CHKHOL/ /FLMCOL/ /PRPS/ /RADL/ /TCO/ /TRNSNT/ /UNITS/	NONE	TCOEF
HCPINS	NHCPINT	/PRPS/ /TCO/	GASTBL	TARRAY					
INPRT	NINPRTT	/BOUND/ /GAAS/ /PRPS/ /RADL/ /SPECL/ /TCO/ /TRNSNT/ /UNITS/	PREP	GETIN					
MAIN PROGRAM	NTTACT	/BOUND/ /FLMCOL/ /GAAS/ /RADL/ /SPECL/ /TCO/ /TRNSNT/ /UNITS/	GETIN PLNUM PLOTMF PREP TCOEF	NONE					

TABLE II. - COMMON-BLOCK CROSS-REFERENCE TABLE

Subroutine	COMMON block												
	BOUND	CHKHOL	FLMCOL	FRIC	GAAS	IMPCOR	MATRX	PRPS	RADL	SPECL	TCO	TRNSNT	UNITS
BLOCK DATA					×								
FLWS		×	×	×				×			×	×	
FLSPLT													
GASTBL					×								
GAUSS							×						
GETIN	×		×			×			×	×	×	×	×
HCFRCD											×		
HCOOL						×		×			×		
HCPINS								×			×		
INPRT	×				×			×	×	×	×	×	×
NTTACT	×		×		×				×	×	×	×	×
PARRAY							×	×			×	×	
PLNUM									×		×	×	×
PLOTMF								×		×	×	×	×
PREP	×		×	×				×		×	×	×	
TARRAY	×		×				×	×			×	×	
TCOEF							×	×			×	×	
THRCON	×										×		
WROUT		×	×					×	×		×	×	×

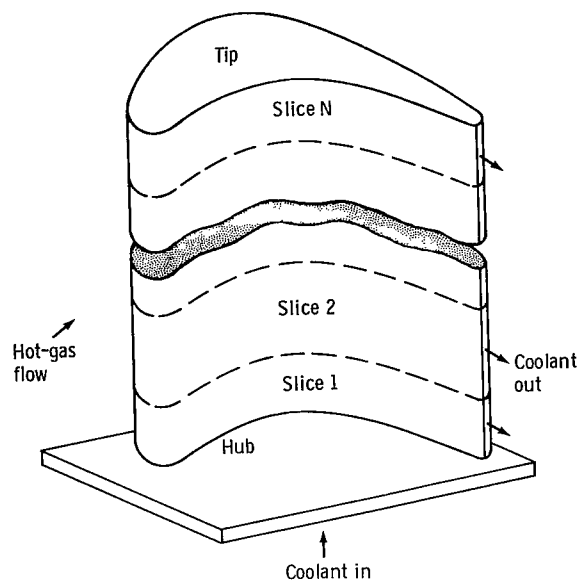


Figure 1. - Overall division of blade into slices.

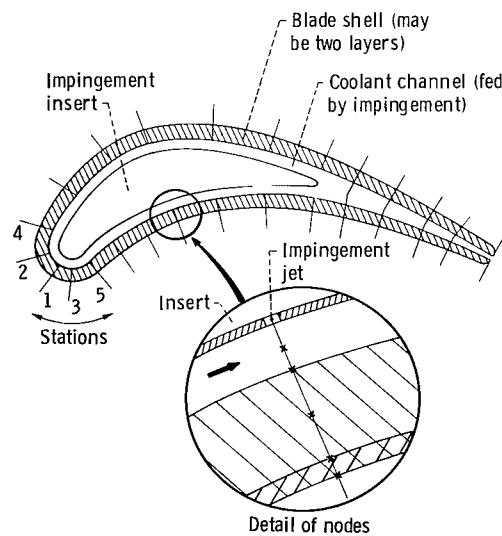


Figure 2 - Blade geometric model.

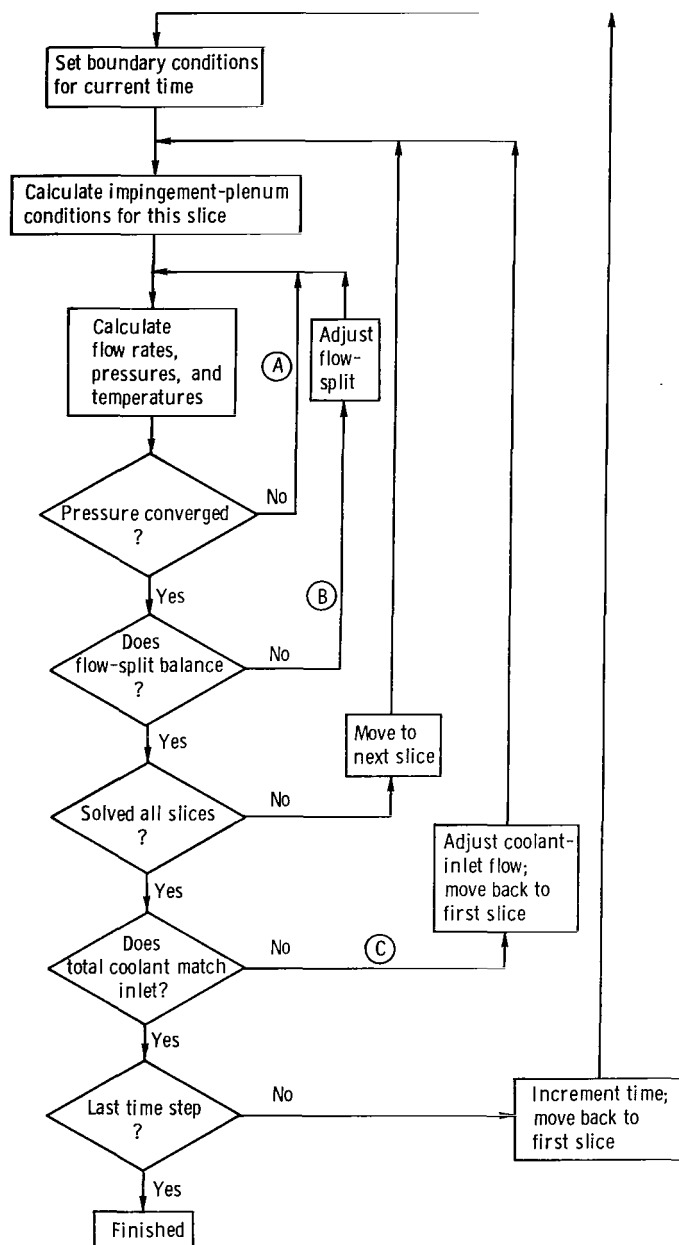


Figure 3. - Overall program procedure.

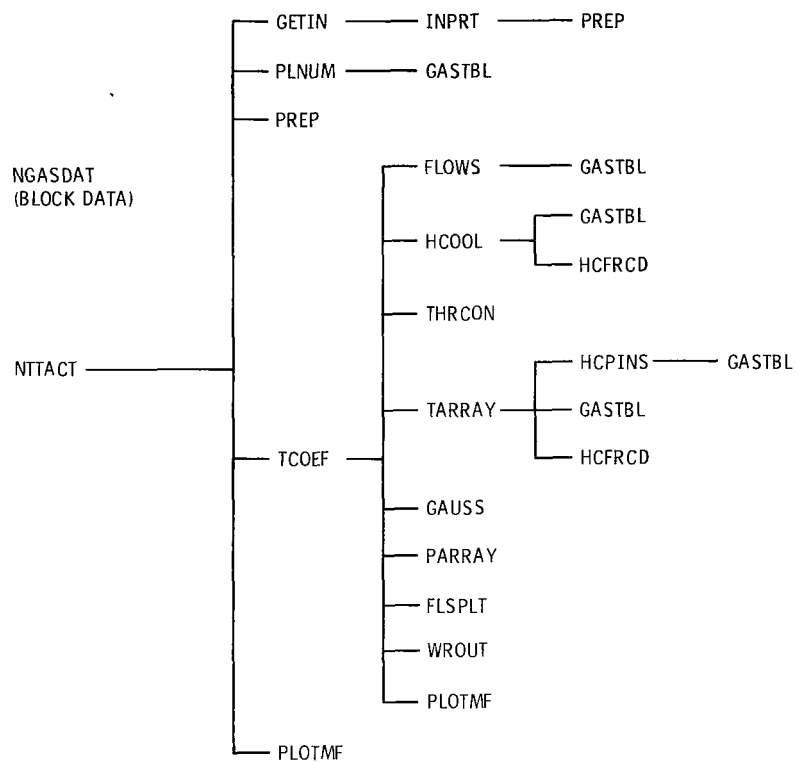


Figure 4. - Subroutine calling relations.

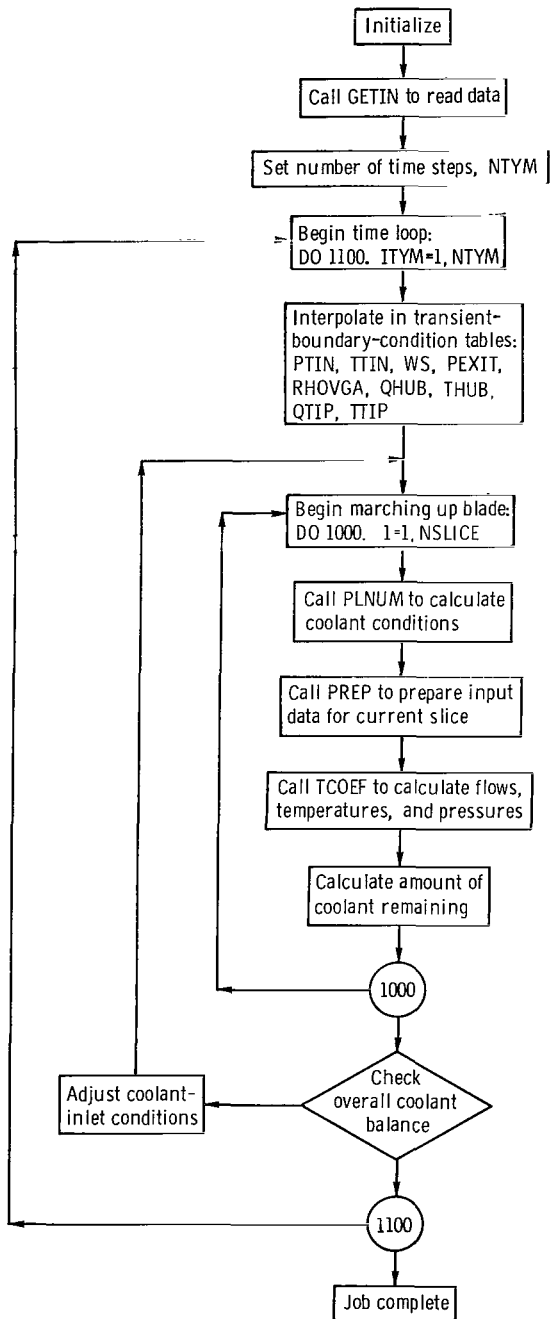


Figure 5. - Flow chart of main program.

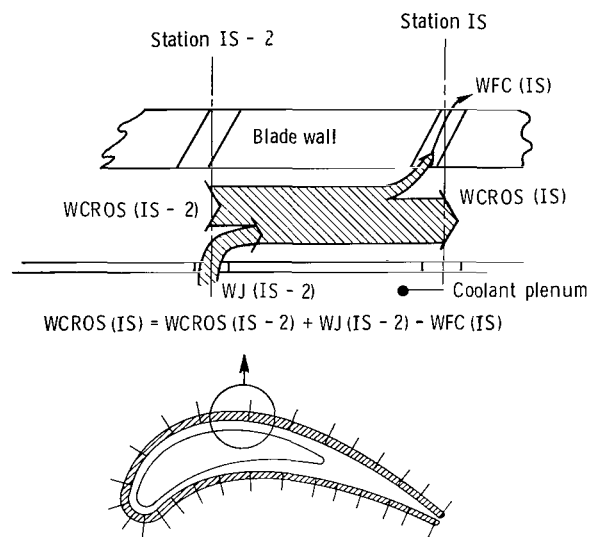


Figure 6. - Coolant-channel mass balance.

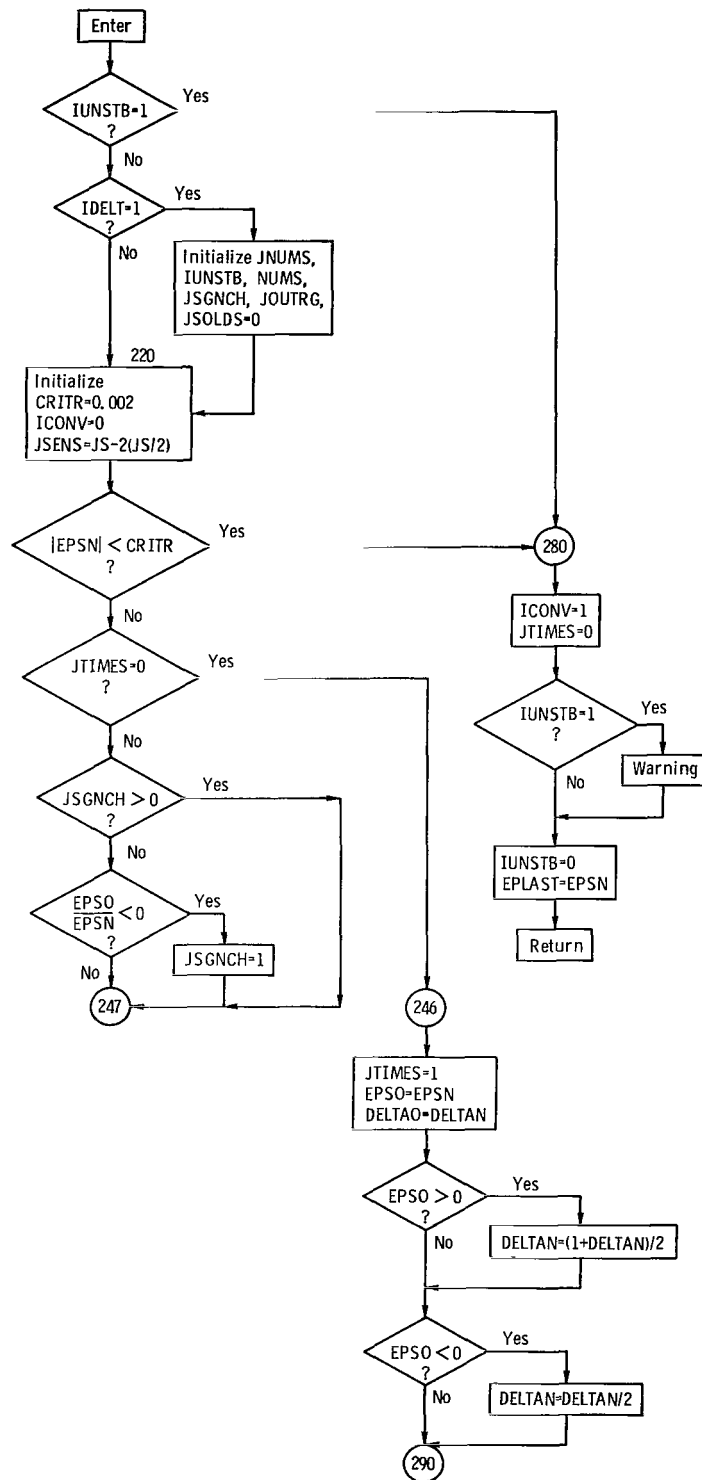


Figure 7. - Flow chart for subroutine FLSPLT.

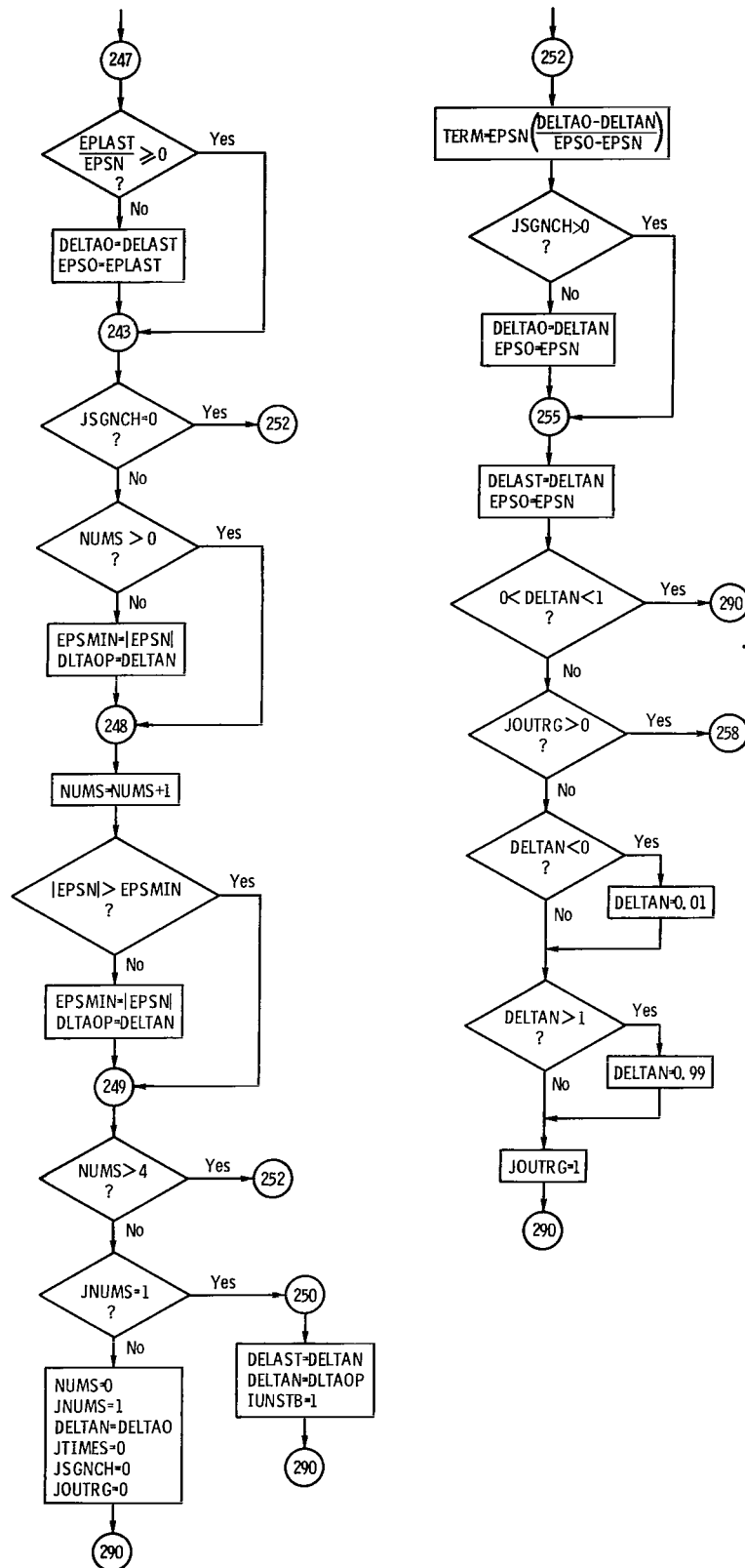


Figure 7. - Continued.

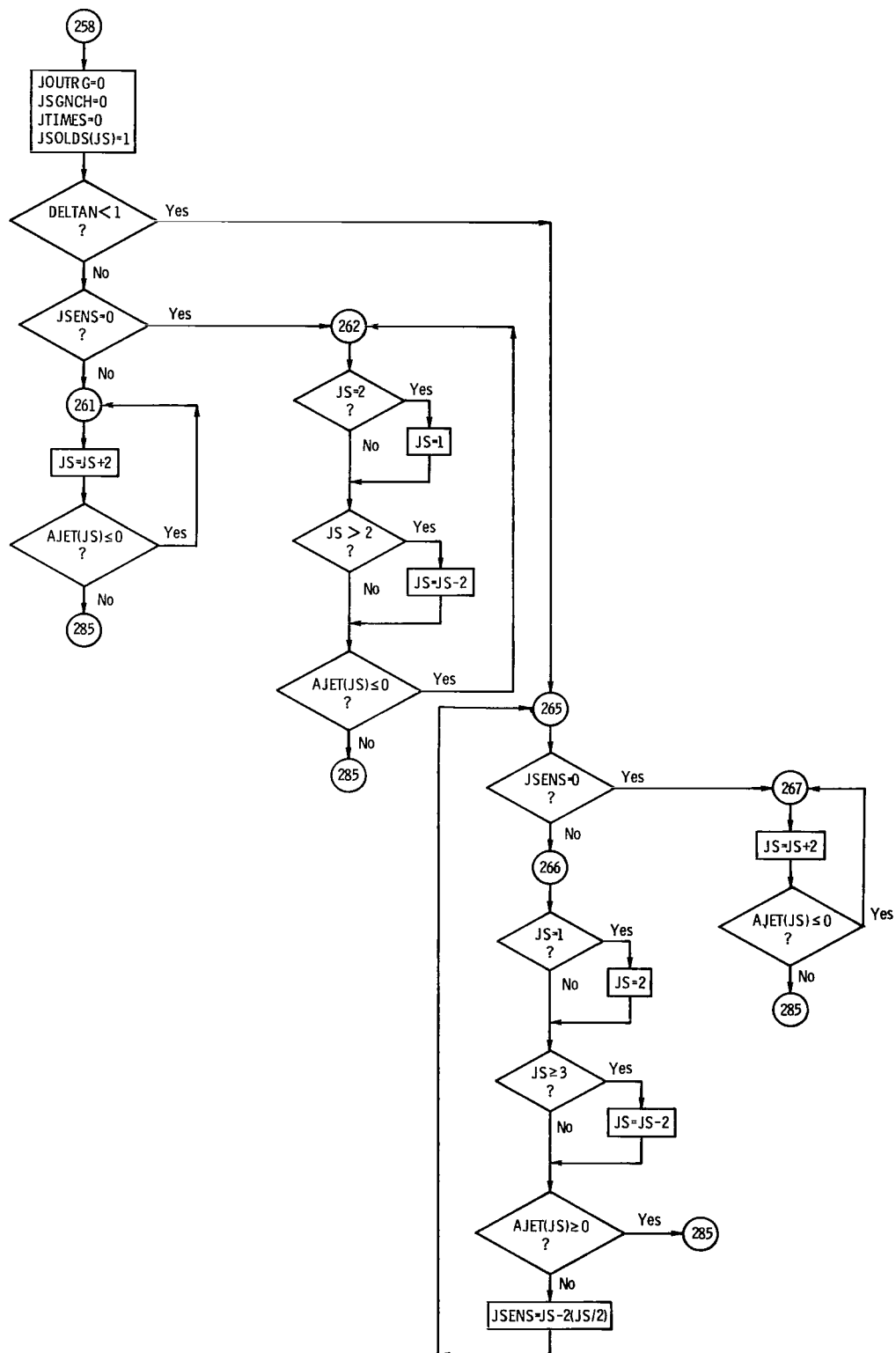


Figure 7. - Continued.

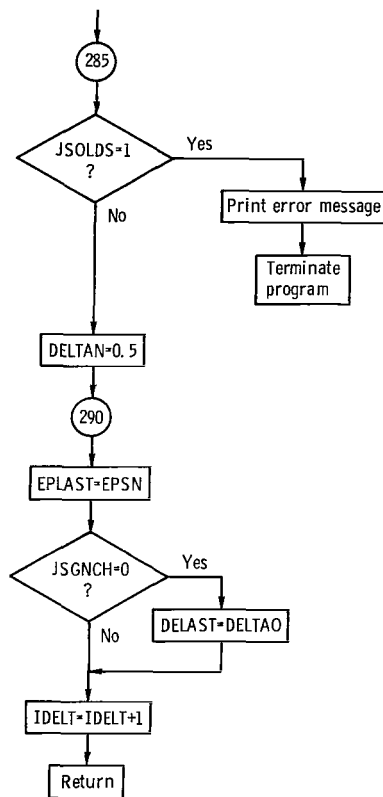
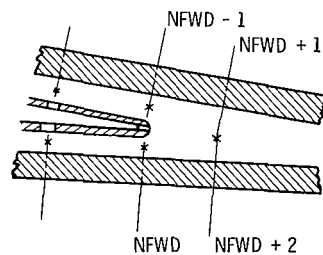
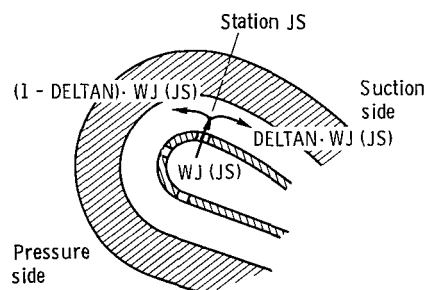


Figure 7. - Concluded.



(a) Detail of station numbering at end of impingement insert.



(b) Detail of flow-split point.

Figure 8. - Details of flow-split parameters.

1. Report No. NASA TP-1391		2. Government Accession No.		3. Recipient's Catalog No.	
4. Title and Subtitle TACT1, A COMPUTER PROGRAM FOR THE TRANSIENT THERMAL ANALYSIS OF A COOLED TURBINE BLADE OR VANE EQUIPPED WITH A COOLANT INSERT. II - PROGRAMMERS MANUAL				5. Report Date January 1979	
7. Author(s) Raymond E. Gaugler				6. Performing Organization Code	
9. Performing Organization Name and Address National Aeronautics and Space Administration Lewis Research Center Cleveland, Ohio 44135				8. Performing Organization Report No. E-9767	
12. Sponsoring Agency Name and Address National Aeronautics and Space Administration Washington, D. C. 20546				10. Work Unit No. 505-04	
15. Supplementary Notes				11. Contract or Grant No.	
16. Abstract <p>A computer program to calculate transient and steady-state temperatures, pressures, and coolant flows in a cooled axial-flow turbine blade or vane with an impingement insert is described. Coolant-side heat-transfer coefficients are calculated internally in the program, with the user specifying either impingement or convection heat transfer at each internal flow station. Spent impingement air flows in a chordwise direction and is discharged through the trailing edge and through film-cooling holes. The ability of the program to handle film cooling is limited by the internal flow model. Input to the program includes a description of the blade geometry, coolant-supply conditions, outside thermal boundary conditions, and wheel speed. The blade wall can have two layers of different materials, such as a ceramic thermal-barrier coating over a metallic substrate. Program output includes the temperature at each node, the coolant pressures and flow rates, and the coolant-side heat-transfer coefficients.</p>				13. Type of Report and Period Covered Technical Paper	
17. Key Words (Suggested by Author(s)) Heat transfer Turbine cooling Computer program Impingement cooling				14. Sponsoring Agency Code	
19. Security Classif. (of this report) Unclassified		20. Security Classif. (of this page) Unclassified		21. No. of Pages 163	
				22. Price* A08	

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